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Indexed in the Industrial Arts Index. Pub-
lished every Thursday. Subscription Price
North America, South America and U. S.
Possessions, \$8; Foreign, \$15 a year.
Single Copy, 35 cents.

Cable Address, "Ironage" N. Y.

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The IRON AGE

ESTABLISHED 1855

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March 22, 1945

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United We Stand

UNITED we have stood and only by united effort can we remain standing. I think this is an axiom that most people will accept.

In the vital matter of planning for postwar employment, this truth is indisputable. It is not a one man job, a one class job or a one community job. It does not start and stop with government, or employers, whether in manufacturing or distribution of products, or with employers in transportation and service occupations. It is not a task for steel plants or machine shops alone or for makers of baby carriages and the other tens of thousands of products that are made, bought and sold, but it permeates back of the counter of the smallest retail store, into the offices of doctors, lawyers, architects and real-estate brokers and beyond these to the hopes and fears for and of the future that involve every man, woman and child in our country. It is an All-American problem that requires the best from an All-American team.

The building of an efficient mechanism for postwar employment like the building of any new machine requires the making of detailed working drawings of parts and sections which finally, after design changes, will come together in a complete functioning assembly. That takes lots of able work by many able people.

We are fortunate indeed in having the general specifications for our postwar employment machine laid down by the Committee for Economic Development. Under its direction and guidance, thousands of our ablest doers and thinkers throughout every state in the Union have been organized to effectuate its purpose, which is to make postwar jobs in the American way. Probably more minds and more effort are being devoted to this single purpose than to any other except that of doing our part in helping to win the war.

But this job is not done, nor will it be done, until its aims are known, understood and appreciated not only by those now engaged in it but by every intelligent person in this country. And particularly should its purpose and how that is being sought be interpreted to and understood by our wage earners and by the general public. The man in the mill or the man at the lathe or the clerk behind the counter, the engineer at the locomotive throttle, the public servant, the doctor, farmer and housewife have as much at stake in this great enterprise, if not more, than has the largest employer in this country. And he or she also can help in making it a success.

Many of you who read this page are doubtless already actively engaged in this work or are at least conversant with it. If not, you owe it to yourself, your company, your industry and your country to become informed about it. For the perfecting of this great mechanism into an efficient operating machine will need the active cooperation of every man and woman of good will and good mind.

More than 600 business publications in our country, covering almost all lines of constructive effort have now been banded together to assist in conveying information to you of the developing activities of this organization and to assist you in spreading it to your employees, your fellow workers and your customers. This publication is one of them. We will be glad indeed to have you write us for information or if you prefer you can address, directly, the Committee for Economic Development, 285 Madison Avenue, New York 17, N. Y.



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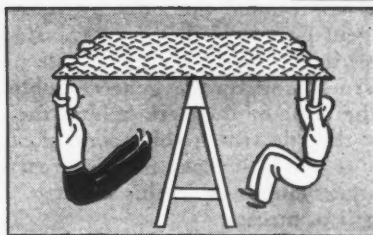
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NEWS FRONT

Lockheed's single-jet fighter, which now is in combat action outpaces the best German aircraft. When performance details of the American fighter are released, the improvement in gas turbine engine design and efficiency will be one of the war's greatest engineering achievements.

Still superior jet craft are on design boards and a building.

The buck-passing and rationalization going on in the Army regarding certain Ordnance items, particularly tanks, doesn't seem to impress the soldiers fighting with the equipment. Smugness in tank design is reminiscent of severe cutbacks and fractional operations of tank plants over a year ago when the talk was that tank warfare had lost its effectiveness.

The Army and Navy have set production goals for WPB that for size and speed equal or surpass anything since Pearl Harbor.

The military are deadly afraid that the American people will go soft on the Japanese war once Germany is defeated. Already there is growing talk of isolating Japan and leaving her relatively impotent but undefeated. And, many a spokesman will have a field day about possessions of other countries in the Pacific being re-won with American lives.

The Navy considers these lines of thought so inevitable that all plans are being forced to put military action in the final phase before widespread weakness of spirit becomes serious.

WPB is getting a little worried about the civilian economy, primarily as regards motor transportation. Repair parts are scarce and the battery and tire situation is serious. Corrective actions are in prospect.

Although Allied airforces have been wrecking German industries, there is no concerted effort to knock out power plants. This is surprising in view of the vulnerability of such installations.

In captured parts of the Rhineland there still is electrical power readily available.

In England, grandiose plans for postwar temporary steel housing seem to be dying a quick death. The idea and the sample houses never created much enthusiasm among the people who were going to live in the houses.

Meanwhile: The British Government is considering the utilization of foamed blast furnace slags for some house construction. An annual production of over one-half million tons is being aimed at; about 25 tons will be needed for a medium house.

Heavy pressure in the aluminum production resurgence is being placed on the Aluminum Co. of Canada, operating completely without use of coal for power, out of consideration for the possible coal shortage here.

News dispatches describing Japanese robot bombs in use at Iwo as "clumsy and ineffective" are reminiscent of the debunking so artistically done by the Army when similar weapons were first used by Germany.

Airlines operators are disturbed at the announcement of the Air Transport Command that regular revenue operations for civilians will be conducted, "to aid regular operators over the war end transitional period," while the Army continues to draft airlines personnel.

Foundries supplying General Motors lack sufficient process control, company production engineers told foundrymen. A characteristic applicable to many foundries is a disregard for doing very much about quality or content of production, the GM panel of standards and inspection personnel said in outlining its viewpoint on the qualities sought in its equipment.

That this lack of control proved expensive was illustrated by two castings received in the rough at GM's Detroit Diesel Division. The scrap on these two amounted to \$128,207 in one year, while further scrapping on these during machining, where foundry defects were uncovered, represented an additional \$627,442.

WPB and ODT have proposed that the steel industry, its suppliers of raw materials and the nonferrous smelting industry be granted draft deferments greater than the 30 per cent of the 26 to 29 group now generally being applied to other industries.

INDUCTION HEATING

A History of Its Development

HIGH frequency electric furnaces are used universally in almost all branches of the industry. Induction heating has emerged far from the developmental stage and has overcome the objection that it is an expensive way to heat. It is expensive and is limited thereby in some applications; its progress has stemmed from the fact that by its use new and better products have been made which could not have been made by other methods. Despite high first costs, economies of speed and mass production permit induction furnaces to show real savings in fields where, only a short time ago, its use from the competitive standpoint seemed impracticable.

In the melting field, substantially all of the "fussy," exact analysis alloys are melted by high frequency. Nickel-chromium resistance alloys, alnico and other magnet steels, gun steels, stainless alloys, tool steels and carbides, copper-lead airplane bearing metals, certain naval and airplane bronzes, gold, silver and platinum, are representative metals wholly, or advantageously, melted by this method. Furnaces range in size up to 10 tons capacity, and are of many types, including units capable of melting and pouring in a vacuum. It is estimated that there are nearly 200,000 kw. of high frequency melting furnaces in use, with small or experimental size units in every metallurgical laboratory of importance in the world.

High frequency heating is used widely for forging, upsetting, spinning and other hot forming operations. Some 60,000 kw. of energy has been installed in comparatively recent years for this purpose. At the present time, most of the production is for war use—shells, bombs, cylinders, gun barrels and the like.

About 40,000 kw. of induction heating equipment is in use for surface hardening and hardening applications, including such operations as the surface hardening of crankshaft and camshaft bearings, the surface hardening of the internal and external surfaces of bearings and bearing race-

. . . In the initial work done by Dr. Edwin F. Northrup in 1916 lies the basis for all future development in induction heating. Contrary to popular misconceptions the first high frequency converters were spark gap oscillators. Motor-generator sets did not come into commercial use until almost 10 years later; vacuum tube oscillators somewhere in between. The growth of applications by the pioneer company in the field is traced and future possibilities pointed out by the author in commemorating the company's 25th anniversary

By Frank T. Chesnut
Secretary, Ajax Electrothermic Corp.,
Trenton, N. J.

o o o

ways, the hardening of rolling mill rolls, the hardening of the points or noses of armor piercing shells, the hardening of the internal walls of engine cylinders, and hundreds of like uses.

Most of the remaining applications of high frequency heating include heating for soldering, brazing or flowing operations; the sintering of carbides; high temperature work, including the reduction of ores, the graphitization of carbon, and the like; the numerous applications of low frequency current; the drying of surface coatings; and the allied but separate field of ultra high frequency dielectric heating. The total installed capacity for these latter operations is small in comparison with the melting, forging and hardening applications due largely to the fact that power requirements for some of the operations are relatively low.

Stage Is Set

The electric furnace art was very meager about 1910, although the arc furnace was in use. The ring type induction furnace was being used to some extent but the undesirable pinch effect phenomenon and the shape of the bath were objectionable. Dr. H. W. Gillett, now of Battelle Memorial Institute, and his associates were about to begin active research on the indirect or rocking arc furnace at the U. S. Bureau of Mines field station at Cornell. Submerged resistor and high frequency induction furnaces had been built, it was very much later found out, but the experiments had been

failures and the projects abandoned.

It was about this time that Dr. Guillian H. Cla-

mer, president of the Ajax Metal Co., was working on a new metallurgical problem for which he believed an electric furnace was the answer. Dr. Carl Hering approached him with an idea for an electric furnace involving the principle of his lately discovered pinch effect. Dr. Hering's idea was that, with two solid electrodes embedded in the bottom of a furnace hearth and liquid resistors immediately above, an electric current passed through the electrodes and the bath would heat the metal and the pinch effect force would cause it to circulate. He believed that if the head of metal over the electrodes was sufficiently great, the liquid conductors would not be disrupted by the pinch effect force.

The Hering furnace idea was tried with water cooled electrodes and direct current. Although the results were sufficiently encouraging to keep the work going for a long time, the water was a continuous source of worry and potential danger. Because of this, Dr. Clamer suggested that the electrodes be eliminated and that the tests be continued using a submerged loop of liquid metal, inductively excited, but still depending upon pinch effort for circulation. Dr. Hering considered such a construction impractical and continued on with his original theories but finally abandoned the project as a failure.

After the Hering tests were discontinued, Dr. Clamer and James Wyatt, an assistant who had been in on the

Hering tests, did make a closed loop submerged resistor furnace and the Ajax-Wyatt furnace, as the new combination was called, became an immediate success. A division of the Ajax Metal Co. was formed to exploit it. The first commercial Wyatt furnace was installed at the plant of the Bridgeport Brass Co. in 1916. It was universally adopted by the brass industry and today well over 95 per cent of all the wrought brass in the world is melted in this type of furnace.

New Method Sought

To work out the mathematical analysis and theory of the new Wyatt furnace, Dr. Clamer called in Dr. Edwin F. Northrup, co-founder of Leeds & Northrup Co., and then on the faculty of Princeton University. So exceptional was his work that Dr. Clamer assigned him the following problem:

"Has any basic principle for developing heat by electrical energy been overlooked in the art of electric heating, and if so, has such basic principle promise of commercial application?"

This was in the early part of 1916, and it is certain neither Dr. Clamer nor Dr. Northrup had any idea that they were actually calling for the invention and development of the high frequency furnace. Dr. Clamer had in mind the development of a furnace

which would have most of the good characteristics of the Wyatt furnace, but which would be more flexible in its operation—a furnace which would melt all metals, and which would be poured clean after each melt, to do away with the necessity of maintaining a so-called holdover charge during non-production periods.

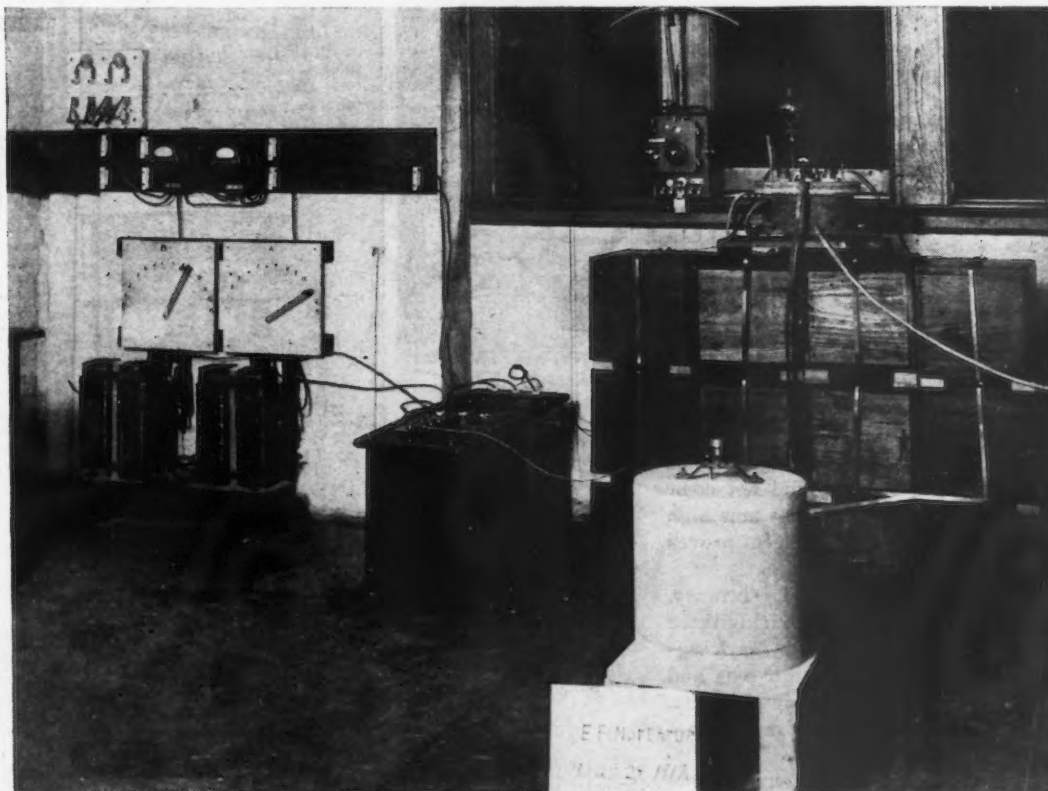
Dr. Northrup reported that the only method which appeared to have promise was the method of heating by high frequency induced currents. Although it was later learned that in 1892 E. A. Colby had conceived the idea of using high frequency currents for melting platinum, and that an



EDWIN F. NORTHRUP proved that "men over 50" are not through. At the time of this photograph, he had invented, and was rapidly developing, his high frequency furnace.

Italian named Jacoviello and a Frenchman named Schneider had toyed with the idea before him, their experiments had failed and their work abandoned. Had Dr. Northrup or Dr. Clamer known of these failures, neither perhaps would have been willing to spend the time and money necessary to carry on the work. Fortunately, the knowledge that persons

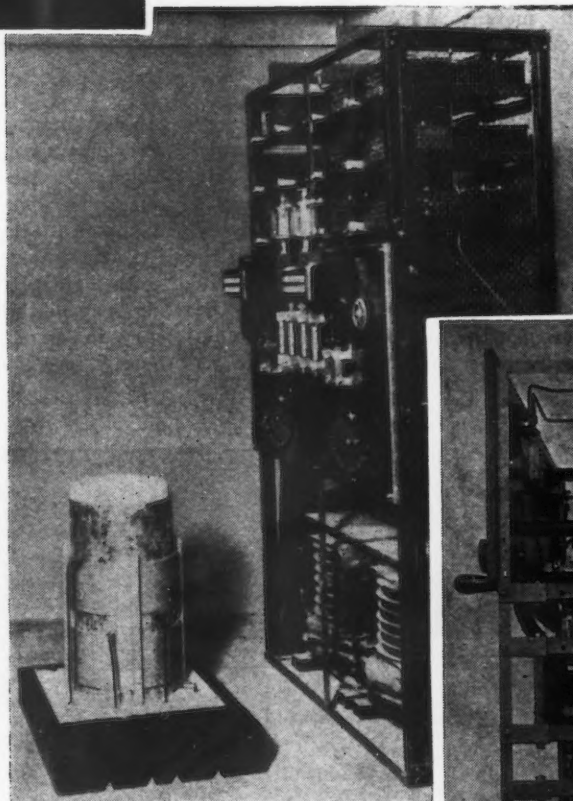
IN this, Dr. Northrup's laboratory at Princeton University, high frequency heating was "born" in 1916.





ABOVE
DR. GUILLIAM H. CLAMER without whose foresight and patient guidance the high frequency furnace would be unknown.

RIGHT
THIS, one of the earliest commercial high frequency furnace equipments, pioneered an industry.



previously had tried and abandoned high frequency heating did not come until several years after the new high frequency furnace had been proved successful.

In 1916 radio was in its infancy. There was no voice radio during those years, but the dot and dash spark signals were used on the high seas and in the regular commercial channels. The vacuum tube oscillator was not yet in wide use.

Dr. Northrup had made experiments

on equipment to produce high frequency current and on the losses in cables carrying such current. He knew that these losses were or could be made large. He chose the problem of trying to increase the so-called "losses" to the point where they would be the useful energy, and the radiated energy would in turn become the loss energy.

First High Frequency Unit

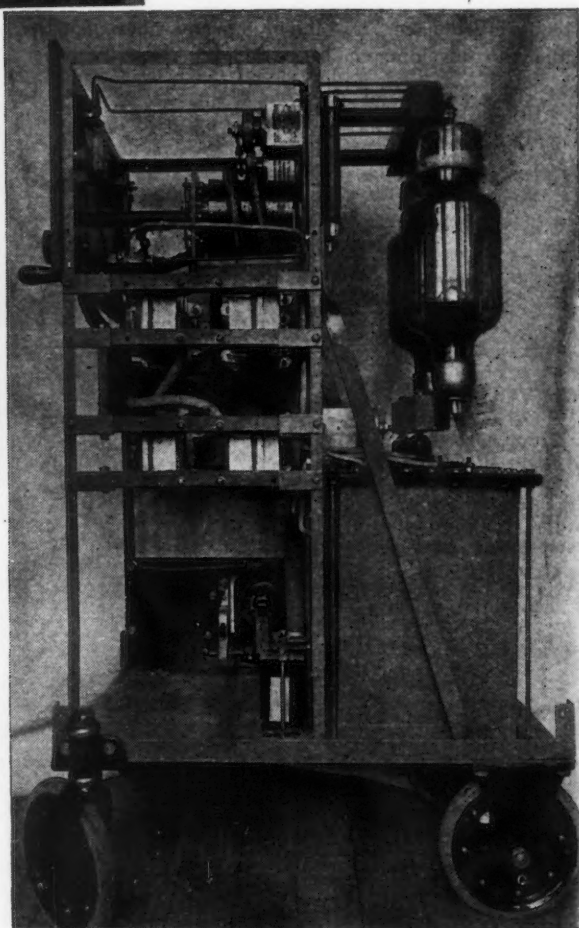
To illustrate his idea, he used a modified Tesla circuit for developing a high frequency oscillating current, similar to the spark gap wireless transmitter of the day—the main difference being in the oscillation coil connections. Where in radio the ends of this coil were connected respectively to aerial and ground and the

energy was radiated, Dr. Northrup eliminated the aerial and ground connections and induced the energy into a charge within the oscillation coil.

The early spark gap converter proved that energy could be concentrated effectively to heat a metallic charge piece, but when an application for patent was made, it was rejected as describing an inoperable mechanism. Argument could not convince the examiner that the device was workable but he consented to witness a demonstration at Princeton University, where tests were being made. When he saw a charge of tin in an earthenware pot melting under the effect of a few hundred watts of high frequency energy induced into it by several turns of ordinary lamp cord, he turned to the patent attorney and said, "Well, Mr. Jackson, what do you want?" The very broadest patent claims were granted since the office had not been able to find any prior art.

The "Ajax-Northrup" furnace, as it was called, became the glamor invention of the day. It was called the "Fireless-Wireless" furnace by newsmen and advertisers. In near magic presentations to the public, eggs were

RIGHT
VACUUM tube converters were used at an early date for induction heating. This is believed to be one of the first equipments built for such use.



fried in an iron skillet, apparently resting on a cake of ice. One could put his hand in the new furnace, and unless he wore a ring, feel no heat—but this same furnace would quickly melt a charge of steel. Dental alloys soon were melted by "radio."

Development Stages

There was a large gap to bridge before this new method of heating could be considered practicable. The radio art was beginning to shift from spark gap devices to vacuum tubes, and the research needed to develop better capacitors, better spark gaps and the like, was turning away from the circuits best suited for inducting heating. Independent work had to be done along these lines.

Because of the surface conduction of high frequency current, one of the first advances was making the inductor coil out of hollow tubing and cooling it with water. As the art progressed to the point where power dealt with became larger and larger, not only the inductors, but the bus bars, main switches, and even some of the generators themselves, were water cooled. The first capacitors were hand made, with sheets of brass and photographic glass plates alternately stacked and immersed in an oil bath. The capacity of the units necessarily was low, and the dielectric so poor that breakdown was the rule. A furnace would operate for a period

of from seconds to half an hour, when the capacitors would fail.

Dr. Northrup finally appealed to the General Electric Co. to make him a high frequency power capacitor. The early cooperation of General Electric Co., especially in respect to these capacitors, made induction heating possible from a practical standpoint. Although good capacitors are now being made by others, it can be said fairly that the General Electric Co. has consistently led the world. Capacitor units of 300 kva. are now no larger than 1/3 cu. ft. volume.

Discharge Gap

The discharge gap also was a continuous source of trouble. It was early discovered that a discharge operating between a solid electrode and mercury was better than one operating between two solid electrodes, and that it was still better if alcohol was dropped into the chamber housing the gap or if the chamber was flushed with a hydrocarbon gas.

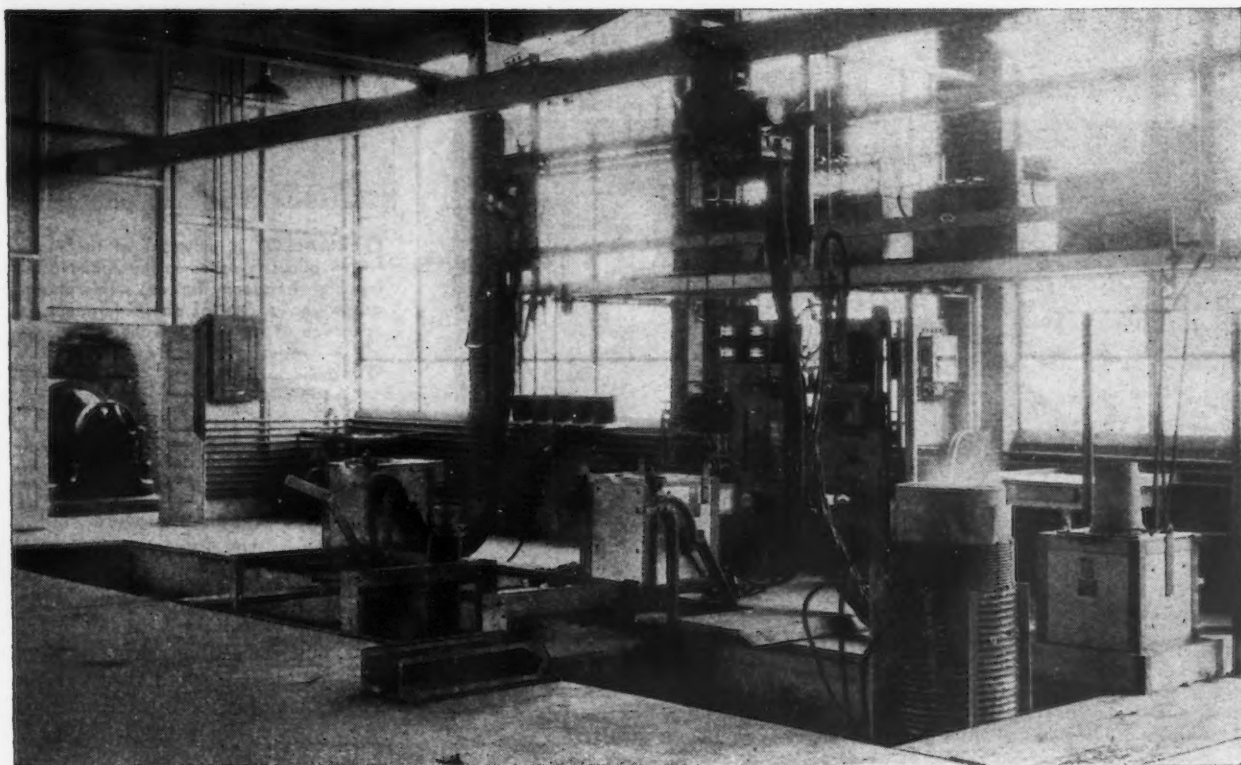
The earliest discharge gaps were noisy and ineffective, and only small

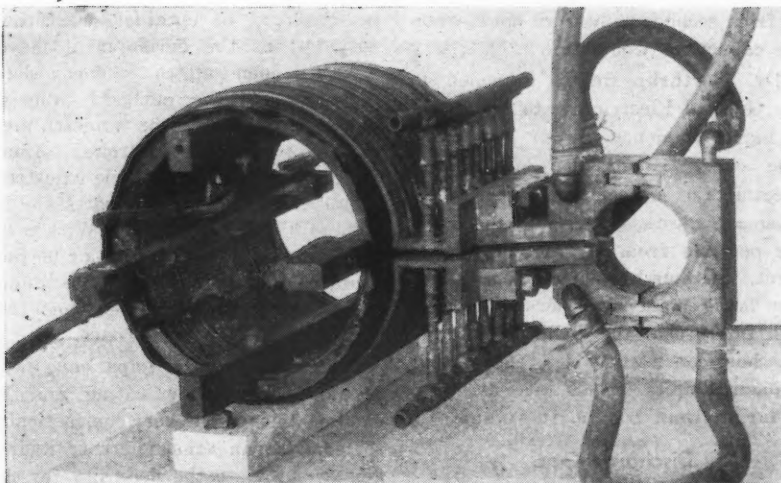
power could be obtained with their use; but as the development moved from the open gap, to the enclosed rotary gap, to the enclosed tungsten mercury gap and to the tungsten mercury gap with a hydrogen atmosphere, the power obtainable rose from hundreds of watts to kilowatts and by 1923 to 35 kva., or 20 kw. With poly-phase units, up to 105 kva., or 60 kw., could be taken from the mains, and a goodly proportion could be turned into useful energy in the furnace.

More recently the gaps have been developed to a 40 kw. rating, and the smaller ones have been hermetically sealed with an atmosphere of hydrogen to eliminate the necessity for the continuous flow of gas through the gap chamber.

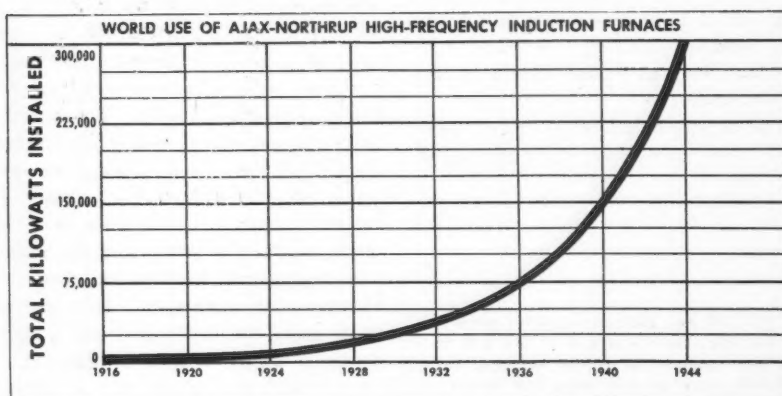
Hydrocarbon gases are explosive when mixed with air; hence the earliest enclosed assemblies were made with blowout seals of mercury; later, with semifragile insulating sleeves; then still later, with mica explosion windows which, after blowing out, could be replaced easily. Today, with the development of better insulators, certain of the gap assemblies are being made of porcelain and steel, so designed that the chamber will be strong enough to withstand the maximum pressure obtainable from a hydrogen-air explosion. In some of these gaps, the hydrogen gas is hermetically sealed within the gap chamber, while in others it is flowed

THIS 150 kw., 2000 cycle motor generator equipment was one of the first to make a commercial appearance and has piloted most of the induction heating and melting processes used so widely throughout the world today.





ONE of the original split wedge type focus inductor blocks used by Ajax in developing the "Tocco" surface hardening method for the Ohio Crankshaft Co.



INDUCTION heating installations have doubled each four years since 1920. This chart includes sales by licensees of Ajax Electrothermic Corp. (Tocco, Budd and foreign).



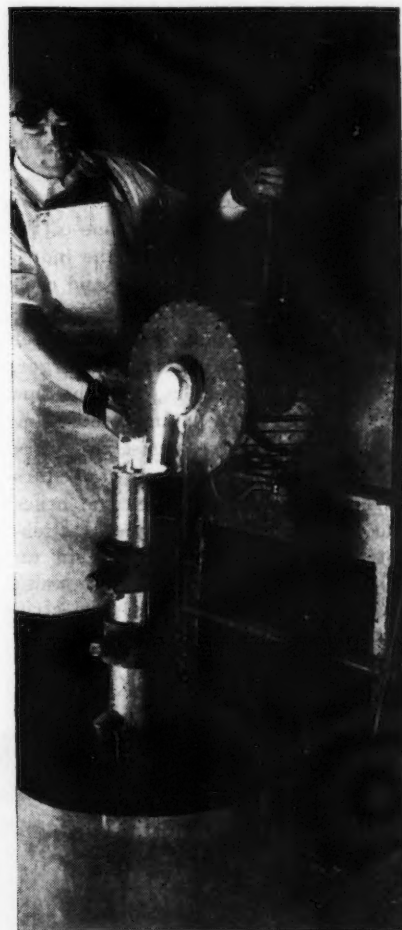
INDUCTION melting. A 5000 lb. charge of steel destined soon to be whirled into a 90 mm. anti-aircraft gun barrel at the Dickson gun plant.

Courtesy Hughes Tool Co.

through the chamber under the control of a pressure governor.

Surface Heating

Surface heating for hardening, so widely exploited and talked about 15 years later, also made its appearance in the early 1920's. Vacuum melting, the degassing of the elements of vacuum tubes, the making of furnace linings, and the like also had received wide attention. "Electronic" or vacuum tube converters were being



PERMALLOY is only one of the many new alloys invented in the Ajax-Northrup high frequency furnace. This photograph shows one of these furnaces in operation at the Bell Telephone Laboratories in the early '20's.

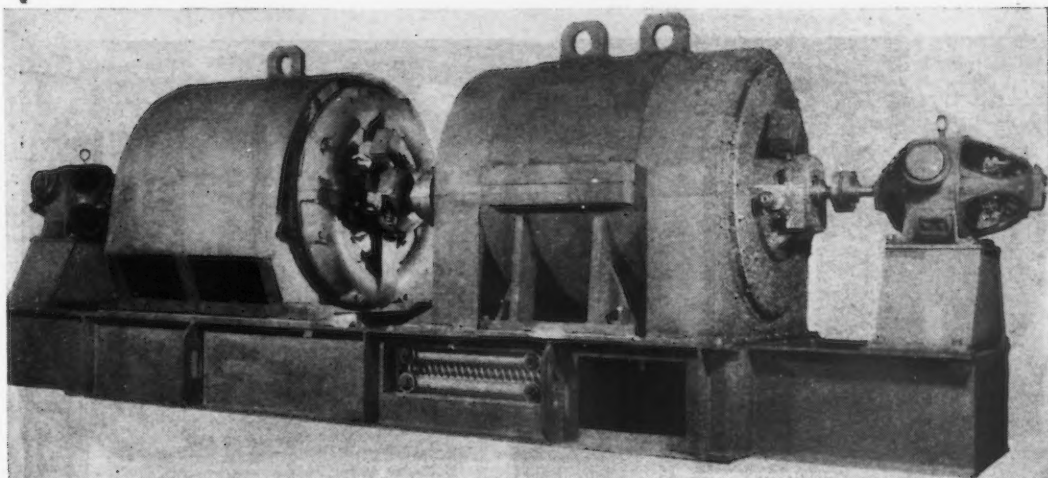
Courtesy Bell Telephone Laboratories.

supplied for certain work at that same time.

The first equipments were sold in 1917-1918 by the Pyroelectric Instrument Co., of Trenton, N. J., a company formed by Dr. Northrup and a few of his associates to make instruments, but licensed by the Ajax Metal Co. to build and sell high frequency furnaces pending the establishment of a company incorporated particularly for that purpose.

MODERN 1200 kw., 960 cycle motor generator set with synchronous motor drive.

Courtesy Westinghouse Electric & Mfg. Co.



The list includes furnaces for precious metal melting, for steel and alloy melting, for the heating of parts in vacuum, for the heat treatment of metal parts, for high temperature work and for many laboratory purposes.

Sales, however, were far from sufficient to cover the cost of necessary development. In 1920, the Ajax Electrothermic Corp. was formed to exploit the Ajax-Northrup furnace, and to try to build up sales to a profitable basis.

Starting with a deficit at the formation, Dr. Northrup and Dr. Clamer embarked on a program to make and sell the furnace that had been developed and to try to find a way to extend the power rating of high frequency equipment to a point where the method of heating could be applied to the industry at large.

Bigger Units Needed

For many years the only generally available means for obtaining high frequency current for induction furnaces were spark gap converters and vacuum tube oscillators. Alexanderson alternators could have been used, but few were available, their cost was very high, and it was not yet known that frequencies in their range were applicable. Furnace units capable of melting 17 lb. charges of steel, or its equivalent, in about 40 min. were available in the early 1920's and focus inductors had been perfected for concentrating large amounts of energy in small localized areas. By that time too, substantially all of the present day applications had been described by Dr. Northrup in his many patents and publications. All he needed was a source of power of sufficient capacity to make larger commercial or industrial applications practicable.

One attempt to build larger furnaces was to combine three heating coils around a single melting chamber,

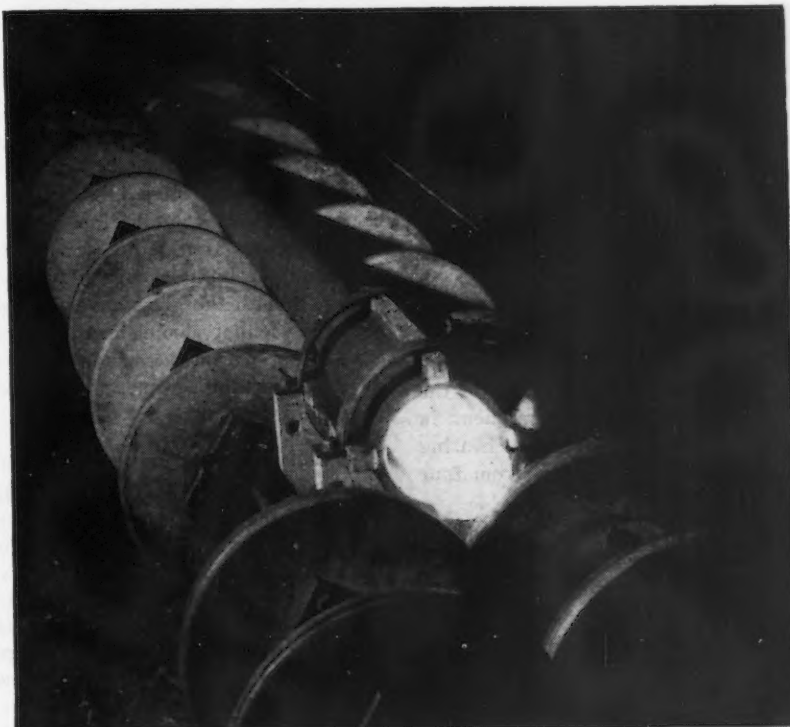
and to operate the combination from a three phase supply. In this way 105 kva. could be drawn from the lines. One such furnace was sold to the Handy & Harman Co. for melting 175 lb. charges of pure silver. Another was sold to the Naval Research Laboratory at Anacostia, D. C., for melting 200 lb. charges of steel or 500 lb. charges of copper. The operation of these units left much to be desired, and they were replaced when motor-generator operated furnaces were available later.

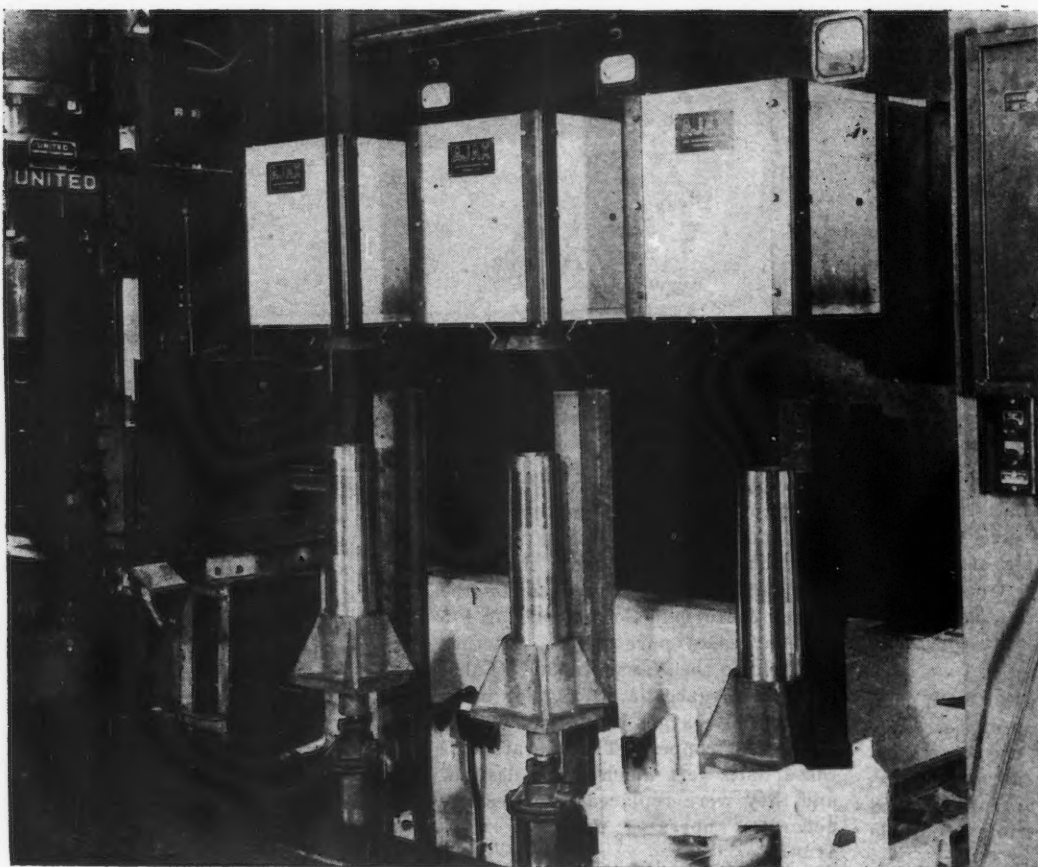
Lower Frequencies Studied

In 1922, high frequency induction heating received one of its greatest boosts. For some time before that

date, Dr. Northrup had concluded that the very high frequency obtainable from spark gap and vacuum tube converters was not necessary for most industrial work; that while the higher frequencies were necessary for small diameter charges, considerably lower frequencies would suffice for larger charges. He believed, if frequencies as low as 1000 or 10,000 cycles could be used, motor-generator equipments could be built of almost any power rating desired. He first contacted Dr. Steinmetz and others of the General Electric Co. and obtained the limited use of an Alexanderson type alternator. These units were very expensive, and of low power rating, but pre-

INDUCTION heating. Here a long 10 in. diameter steel tube is heat treated on the fly as it passes through an inconspicuous heating coil.





INDUCTION heating. These three heaters at the United Engineering Company's plant are used for heating 155 mm. shell blanks for a hot nosing operation. The blanks are elevated into the coils by air cylinders.

liminary tests showed that his calculations were correct.

Following these tests, he purchased a 100 kw., 540 cycle generator which had been built for radio use. With the cooperation of E. R. Frost of the National Machinery Co., he had the generator installed at the company's plant at Tiffin, Ohio, and carried on tests which further proved his position. His tests were sufficiently broad in their scope to cover both heating and melting, and for charges of various sizes and material. Patents were obtained and they have been recognized throughout the world. Profit could not begin to materialize, however, until all parts of the motor-generator operated equipment could be designed and built, and the industry at large could be convinced of the value of this type of equipment in competition with existing heating methods. This period was from four to ten years.

Although it did not show up visibly in general industry, induction heating advanced very definitely from 1922 to 1926. During those years, much effort was expended in designing and improving equipment for generator operated furnaces, and in studying the possibilities for its application in the

many branches of the industry.

Converter development was not overlooked during this period and its use was extended in laboratory and semicommercial work. In 1923, exclusive rights for using the equipment for heating the elements of vacuum tubes during the sealing period, to drive off the occluded gases, were sold to Westinghouse.

Had the Northrup furnace done nothing else to recommend it, its place in history would have been assured because of its contribution to the vacuum tube and radio art. The ability of the high frequency furnace to act through the glass envelope and heat the vacuum tube elements during the sealing period has made possible the enormous improvement which has resulted in that art.

Large Power Generators

In the period after 1922, the General Electric Co. again came to Dr. Northrup's assistance by designing and building high frequency motor-generator equipments in the range of frequencies from 540 to 2000 cycles. The units were of the salient pole type and were the forerunners of the present inductor type alternators.

The first commercial induction fur-

nace operated with motor generators were installed in 1925-1926 at the plants of the American Brass Co. at Waterbury, Conn., for brass melting; the Babcock & Wilcox Tube Co. at Beaver Falls, Pa., for steel melting; and the Ajax Electrothermic Corp. at Trenton, N. J., for general experimental work, the melting of a special steel magnet alloy, and for demonstration purposes. These, with the almost simultaneous installation by licensees at the plant of the Edgar Allen Steel Works in Sheffield, England, were the pioneers for this type of equipment.

The American Brass Co. was quick to appreciate the value of the furnaces in the brass industry, and in 1926 purchased exclusive rights for high frequency melting in the wrought brass field. The funds made available from this sale were of inestimable value in advancing induction heating. Today there are men in high government positions who condemn restrictive licenses; but only by making the agreements, first in the vacuum tube field and later in the wrought brass field, was induction heating developed to the state where it is considered indispensable in the winning of the war.

With the help of Dr. Northrup and

Dr. Comfort Adams of Harvard University, as consultant, Isaac Harter of the Babcox & Wilcox Co. early built up one of the largest and most flexible specialized steel casting foundries in the United States. With these first installations as examples, induction furnaces quickly spread into the steel industry. Heppenstall, Firth Sterling, Lebanon, Carpenter, Durion, Bethlehem, Midvale, Hoskins and others followed at an early date. Simultaneously equipments were being installed in other parts of the world by licensees under the Northrup patents.

Surface Hardening

Early in the 1920's, the Midvale Co. purchased a converter type equipment and used it for experimental steel melting and for heat-treating applications. When generator operated equipments became available, it was the first to take license and inductively heat large rolling mill rolls for surface hardening. It was proposed to carry the work on for other surface hardening applications such as hardening of internal bores of cylinders, and the like, but the depression of the early 1930's made it difficult to get industry interested.

Surface hardening was again opened up in 1932 when the Ajax Electrothermic Corp. applied induction heating to crankshaft bearings for the Ohio Crankshaft Co. of Cleveland. Budd Induction Heating Corp. also was interested in surface hardening, but more particularly for internal surfaces. A license was granted jointly to these two companies to make

and sell induction heating equipment for hardening. Later the field was further divided into external and internal applications respectively. The exclusive licenses were limited to frequencies of 10,000 cycles and below, and non-exclusive licenses were broadened to cover other applications such as heating for forging, brazing, welding and the like. What these companies have done to spread induction heating is well known. Howard Somes, chief engineer of the Budd company, has been responsible for most of the recent development of internal hardening applications.

High frequency heating was fast becoming an industrial "must" when the depression of the early 1930's hit it. The result of the depression was to slow its pace, but not to hold it back for long. Its value had been determined for large scale production work in melting, forging, hardening and the other applications listed at the beginning of this paper. In the very middle of the depression Ajax received an order for a 4-ton steel melting furnace powered with a 1200 kw. generator. This unit was for the Illinois Steel Co. Other large sized units were sold first to licensees abroad as the war production began to rise there, and then in the United States.

Future Trends

The number of kilowatts of induction furnace equipment installed at the present time is over 300,000 kw., disregarding equipment put into operation by the Axis countries during the war, and disregarding some of the vacuum tube applications of which

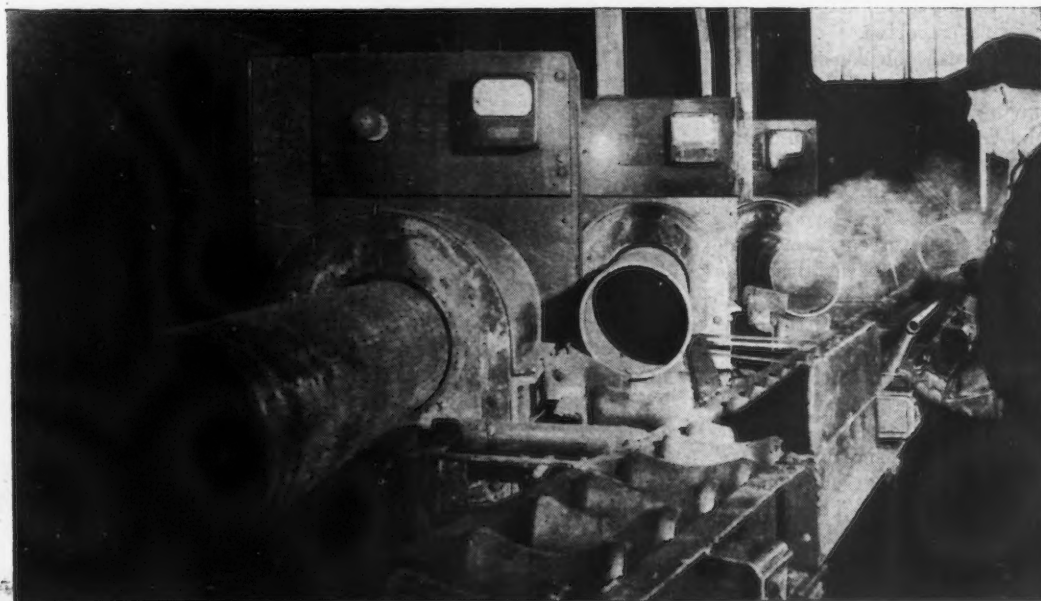
no record is obtainable. The rise in use has been very steady, the total amount substantially doubling itself each four years since the first few converter operated units were installed in 1917-1918; and the trend is as yet unchanged. These installations are divided roughly 65 per cent for melting, 20 per cent for forging and 15 for hardening applications.

The largest generator built has a rating of 1800 kw. The largest melting furnace will melt a 10-ton charge of steel. The largest single installation of melting equipment is over 10,000 kw., capable of turning out 16 tons of steel every hour. The largest single installation of heating equipment for forging is 7000 kw., capable of heating billets for an average production of one 105 mm. shell every 3½ sec. In one plant over 158 different parts are being heated by induction for various hardening operations. Over a year ago one gun plant publicly declared that it had turned out its 100,000th gun barrel—principally the 90 mm. anti-aircraft size—melted by induction and cast by the centrifugal casting method.

Induction heating equipment lasts a long time. It is believed every generator operated equipment sold, barring war damage, still is in operation. Even though the market may be oversold on account of the war, there will be much conversion work to do. Indications are that not only will the existing equipments be turned to peacetime effort but the war averages soon will be adjusted and more new equipment will be required to keep the industry abreast of the times.

INDUCTION heating. Tubes being heated for a nose spinning operation.

Courtesy National Tube Co.



Automatic Arc Welding Of



FIG. 1—A dense even bead of weld metal as shown here is an inherent characteristic of the automatic carbon arc welding process applied to aluminum.

AN aluminum fabricating method which has become favored by volume producers of items such as tanks, pipe, vaults and similar structures, is the automatic shielded carbon arc welding process which provides low costs of construction and high quality welds that are frequently better than those specified by the de-

signers. A number of interesting applications of automatic welding of aluminum have been recently reported.

One such job consists of the welding of thousands of tanks having a dished head on one end and made of $\frac{1}{4}$ in. aluminum. The vessels measure 6 ft. in length by 24 in. in diameter. Specifications called for a strongly reinforced seam inside and out. High speed fabrication was obtained by welding both the longitudinal and girth seams in one pass, producing a high quality bead such as that shown in Fig. 1.

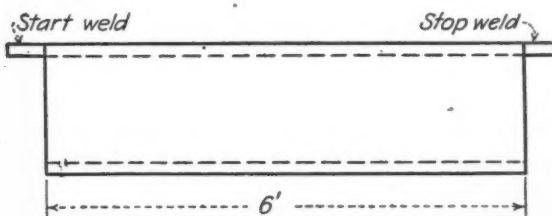


FIG. 2—Sketch showing method of tacking scrap pieces on tank shell for starting and stopping of longitudinal weld bead.

The tank shells are first tack welded and a short length of scrap is tacked at each end of the joint, Fig. 2. These scrap pieces, which serve as starting and stopping points during the automatic welding, are knocked

off the work after the longitudinal seam weld has been completed. Both longitudinal and girth seams are square butt welded without joint preparation such as beveling.

Using an automatic machine similar to that shown in Fig. 3, known as the "Electronic Tornado," a welding speed of 16 in. per min. is obtained.

With this system the carbon arc is fully controlled by focusing the heat in a concentrated area directly underneath the arc. A dense uniform head is obtained by automatically depositing an autogenizing element in the form of a powder flux directly on the work just ahead of the carbon arc. The powder melts and forms a slag which protects the molten metal.

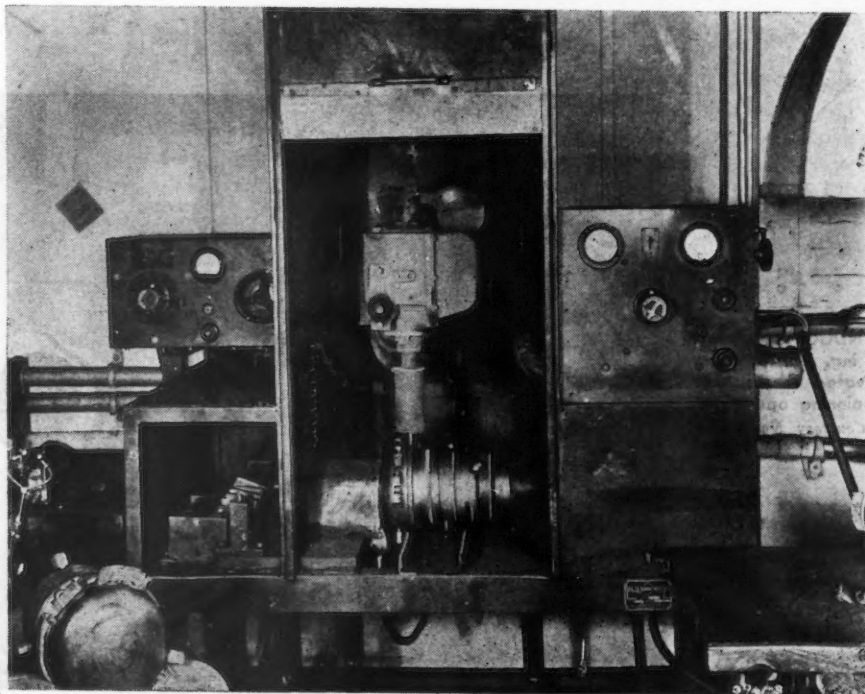
In welding the $\frac{1}{4}$ in. aluminum tank, $\frac{3}{16}$ in. filler wire having the same specifications as the parent metal was used in conjunction with a $\frac{3}{8}$ in. carbon. The machine was set at 350 amp. and 35 volts. According to the manufacturers, excellent results are being obtained. Each tank is fully tested and leakage has been found negligible.

The practicability of welding various aluminum structures by the automatic arc welding process is further evidenced in data received on

LEFT

BELOW

FIG. 3—Typical machine of the carbon arc welding type.



ing Of Aluminum Structures

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other current applications. One job, for example, is the fabrication of 26 in. diameter aluminum pipe in 72 in. sections. Pipe thickness is $\frac{1}{4}$ in. As in the arc welding of the tanks previously described, the joints are of the butt type and welded without beveling.

The formed pipe is placed in a horn type jig with hold-down shoes located adjacent to the seam as shown in Fig. 4. The work is bowed upward approximately $\frac{3}{8}$ in. at the joint and clamped in the fixture to compensate for distortion due to heat. A copper backup bar having a $\frac{1}{32}$ by $\frac{3}{16}$ in. groove is placed along the underside of the seam as illustrated in Fig. 4. With the machine set at from 360 to 380 amp. and 33 to 34 volts, the carbon carries the current which penetrates the joint and the molten metal takes the form of the backing strip which in this case forms a reinforcement on the underside of the seam. The added $\frac{5}{32}$ in. filler rod supplies sufficient volume of metal to produce the necessary reinforcement on the top side of the seam.

Speed of the travel in this case was 16.5 in. per min. with 22 in. of $\frac{5}{32}$ in. filler rod consumed per foot. The

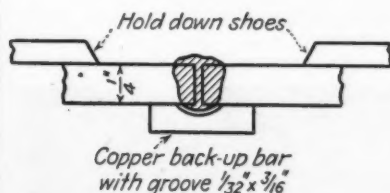


FIG. 4—Cross-section of 26 in. pipe welded by the automatic process.

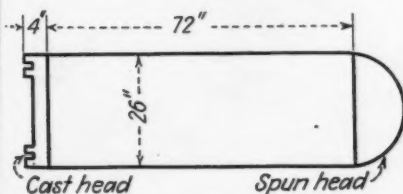


FIG. 5—Aluminum tank with a cast head and spun head welded to an aluminum tube.

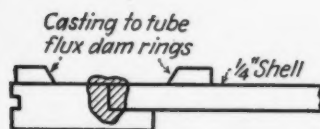


FIG. 6—Flux dam arrangement used in joining seam of cast head and aluminum tube.

... Smooth welds can be obtained in $\frac{1}{4}$ in. aluminum carbon sheets at speeds up to $16\frac{1}{2}$ in. per min. with automatic arc welding equipment, without the necessity of beveling the edges of butt welds. The automatic carbon arc process for welding aluminum described in this article is now being used on a vast scale to fabricate special military bridge structures (See The Iron Age, Feb. 15, p. 106). Last month engineers from 14 companies involved in this new program attended courses in the application of "Electronic Tornado" welding at the Lincoln Electric Co. plant.

report further states that No. 520 Aluminflux was used throughout as an autogenizer, 1.2 oz. of the flux being used per foot of weld at a footage cost of 4.9c.

The automatic welding of aluminum alloy heads to an aluminum tube of 26 in. diameter presented another interesting automatic welding setup. A cast head is welded to one end and a spun aluminum head to the other (see Fig. 5).

In welding the cast head to the tube, two rings are located adjacent to the joint to act as a dam for the flux, Fig. 6. A $\frac{5}{32}$ in. aluminum filler rod is also used for this application with amperage set at 325 and voltage at 32. A speed of 14 in. per min. is maintained in welding this casting, with the carbon arc positioned 1 in. off center to the left, with the work rotating clockwise, as shown in Fig. 7. The aluminum tube is $\frac{1}{4}$ in. in thickness.

The spun head is welded to the tube by first positioning the work in a removable copper backing jig, Fig. 8, with a groove at the joint in the holding arm. Here again, a flux dam is provided by means of shoes located adjacent to the joint as shown in the sketch. The same machine current, voltage and speed are obtained as in the welding of the cast head. Also, the same flux and type and size of filler rod is employed.

In all cases presented, the high quality and low cost indicates that the automatic shielded arc method is extremely efficient for the welding of aluminum as well as for other metals.

The process is fast because:

1. The joints are square butt (no bevel) and therefore require very little deposited metal as compared with the conventional type joint with a bevelled edge.
2. The filler metal does not carry the welding current so the size of the wire ($\frac{5}{32}$ to $\frac{3}{16}$ in.) does not limit

the maximum current which may be used.

3. The flux is introduced to the arc independently of the filler metal or the carbon electrode so the amount of flux can be regulated to meet the requirements of the high welding currents.

4. Uniform travel speed and automatic control of the current, voltage, filler metal, and flux permit the use of high welding currents.

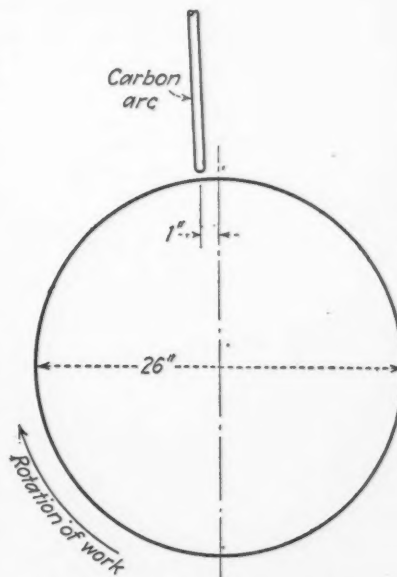


FIG. 7—Carbon arc is positioned 1 in. off center as an aid in controlling the flow of weld metal before solidification.

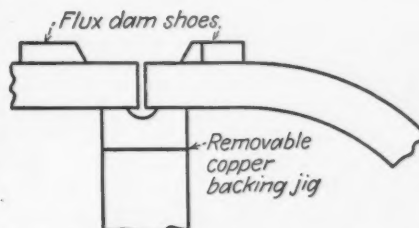


FIG. 8—Detail of joint and weld bead for joining spun aluminum head to tube.

Metal Cleaning Before Silver Brazing

... A common cause of trouble in silver brazing operations is poorly cleaned surfaces. Alkaline and acid cleaning solutions used with proper pH control can consistently provide chemically clean surfaces necessary for joining any metal surfaces.

LOW temperature silver brazing (1175 to 1300 deg. F.) has become one of the most

widely used methods for joining metals in the aviation, munitions, and other war industries and is fast replacing welding and soldering procedures on many types of construction and repair. The comparative high speed and ease of operation as well as the high degree of tensile strength obtained through the use of low temperature silver alloy brazing has resulted in a widespread demand for this means of metal joining throughout wartime production.

The proper application of this method has invariably resulted in

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o o o

simplifying manufacturing operations so that they could be handled by less critical equipment and has also saved much material. Using silver alloy brazing has made it possible to repair many tools that heretofore had to be replaced with new ones.

As in the case of other metal joining operations like plating, soldering and in some instances spot welding, brazing with silver alloys requires

large savings in time and money. It has in many cases released critical machin-

ing equipment by

o o o

A TYPICAL installation of dip tanks for precleaning metal parts prior to brazing with silver alloys.

clean metal surfaces upon which to work. The presence of oil, grease, oxides, scale or inert soil particles all interferes with a good braze joint since the melted alloy will not wet and flow over an unclean surface.

The advantageous low temperature range emphasizes the importance of clean surfaces when metal is being joined. High temperatures and the resultant long cooling periods, such as is found in torch welding, require less critical cleanliness and operators familiar with high temperature welding are inclined to think of low temperature brazing in the same light.

However, Handy & Harman, one of the largest suppliers of silver brazing materials have discovered a very definite relationship between surface cleanliness and successful silver brazing and they have repeatedly stressed the importance of cleanliness in their technical bulletins. In the seven steps necessary to satisfactory brazing outlined by them, the importance of properly cleaned surfaces is second



only to fit of pieces to be joined. It is their feeling that the manufacturers of silver brazing alloys cannot be logically held responsible for unsatisfactory results when such are the result of improperly prepared surfaces and cleaning negligence.

Regardless of whether furnace induction, resistance or gas torch heating are used, the metal must be chemically clean for best results. This means the complete removal of:

- (A) Oils, greases and fatty acids
- (B) Oxides, scale and foreign matter.

Flux is used to prevent fresh oxidation of the metal surfaces during the heating period and is not intended to replace cleaning in any sense. Abrasives and wire brushing have been accepted in some past instances as being satisfactory for cleaning prior to brazing, but this type of cleaning is slow and therefore inefficient for production brazing, besides being costly.

Existence of any of the deposits referred to above can cause any and all of the common failures which result in rejection. Some of these failures are the irregular flow of the alloy, complete misses in spots, and porosity of the braze alloy. When impurities exist beneath the flux they create excessive gassing and when the alloy reaches the molten state these gases erupt through the molten metal. Impurities of an inert nature also will rise and deposit themselves on the surface. If the heating cycle is fast these gases and impurities do not have time to purge themselves from the alloy and porosity and craters are the result when the braze cools. A chemically clean surface will not evolve such disturbances, consequently, the shortest cycles will still give excellent results.

The oils, greases and fatty acids require wetting out and hot alkaline bath treatments for their removal since the pH value of these deposits is definitely on the acid side. On the other hand, oxides and scale are pH opposites to the oils and greases and will only respond to acid or pickling treatment. If intelligent attention is given to these cleaning processes, they may be simply and efficiently installed and operated. Low operating costs are easily maintained.

Vapor degreasing is often misused, on the assumption that it replaces chemical cleaning. Only under circumstances where clean oil or grease is to be removed can this method be relied upon to produce clean surfaces. Unfortunately, this occurs very rarely. When other deposits exist, such as scale or oxides, they remain

SIMPLE tubular part before and after cleaning prior to silver brazing.



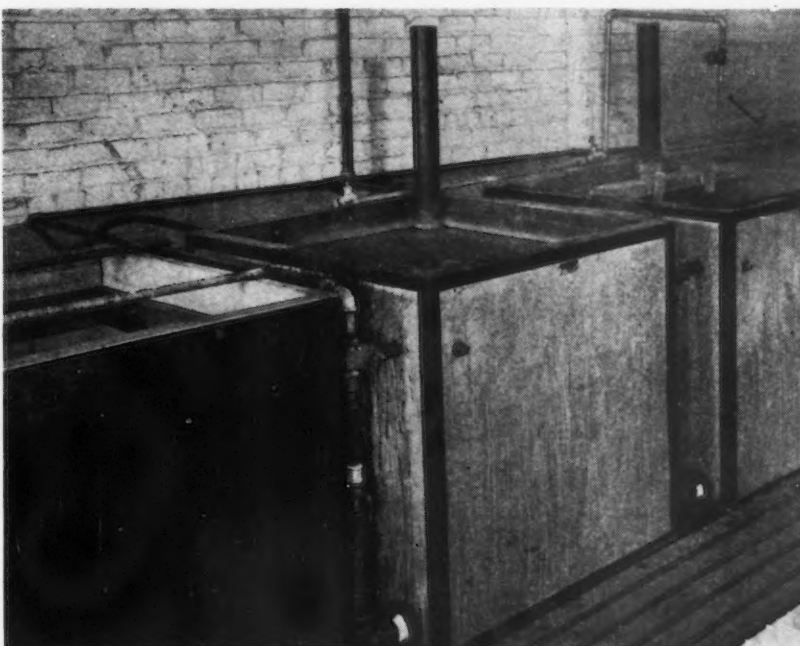
on the surface and prevent satisfactory braze joints.

Steel is frequently oiled or treated to prevent corrosion and oxidation and these coatings often present difficulty in securing thorough and complete removal. Fish oils, lard oil and petroleum products are encountered and parts which have been machined, stamped or drawn bear various types of drawing and stamping oils. In the case of stubborn deposits, where oil or grease may have become oxidized

from heat, a 15 min. soak in a solution such as Kelite Ketrex, mixed 50/50 with kerosene is indispensable. The soak wets out the stubborn bond between the deposit and the metal so that a subsequent bath in an alkali such as Kelite Keprocess (13.0 to 13.2 pH) can saponify and float the deposit away.

No acid can work effectively in the presence of greases since grease is an insulation against acidic action. Having removed this deposit of oils

THESE two Tivit tanks, one a hot rinse and the other a hot alkali, are heated by gas and correct temperature is maintained by thermostatic control.



and greases, the oxides, scale and inert soil are laid bare to the action of the acid pickle, and the acid does a thorough job of removal. A soak in a pickling agent like Kelite Scale-Off, which is inhibited against attacking healthy metal, will complete the cleaning and prepare the metal for satisfactory brazing.

The following procedures are used for cleaning various metals prior to silver brazing:

Stainless steel or Monel metal:

1. Presoak in Kelite Ketrex 50/50 with kerosene for 15 min. at room temperature.
 2. Rinse thoroughly in cold water, pressure preferred.
 3. Immerse in hot alkali (Kelite Keprocess) 190 to 200 deg. F. 13.0 to 13.2 pH for 15 min. or until a no water break surface exists.
 4. Rinse in hot water at 120 to 140 deg. F.
 5. Immerse in acid pickle (Kelite Scale-off) 1 to 5 min. to thoroughly remove oxidation and discoloration.
 6. Rinse thoroughly in cold water.
- Steps 1 and 2 can be eliminated if deposits are not stubborn.

For cleaning low carbon and high carbon steel, the same process is used as above except that in step 5 Kelite Scale-Off is mixed with 25 to 50 per cent of strength with cold water. For cleaning brass, copper and nickel, a hot alkaline bath of somewhat lower pH value (12.0 to 12.6) is used, and the parts are dipped in full strength acid pickle for a few seconds to 1 min.

Hot water will usually remove flux after brazing, but in the case of stubborn deposits an acid pickle or Kelite No. 184 will easily remove them.

Heat Treating Steels From Rolling Temperatures

H EAT treating steels directly from the rolling or forging temperatures was found to improve the physical properties of the steels according to tests conducted by O. Kukla, W. Kuentscher and H. Sajosch as reported in *Stahl und Eisen*, vol. 62, Dec. 17, pp. 1067-73. The steels used included unalloyed steels with 0.16 to 0.52 per cent carbon and steels containing chromium, nickel, molybdenum and vanadium.

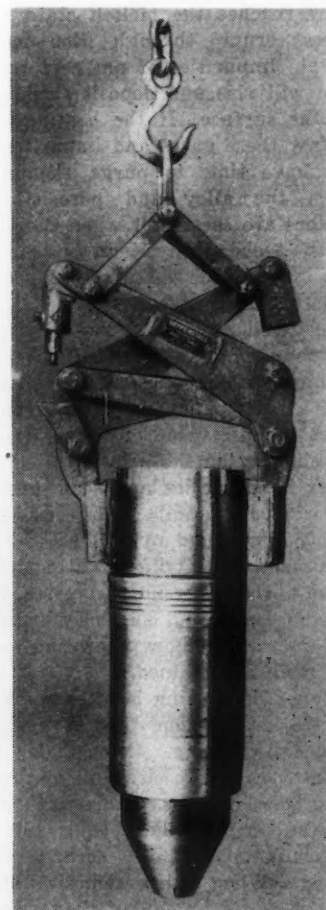
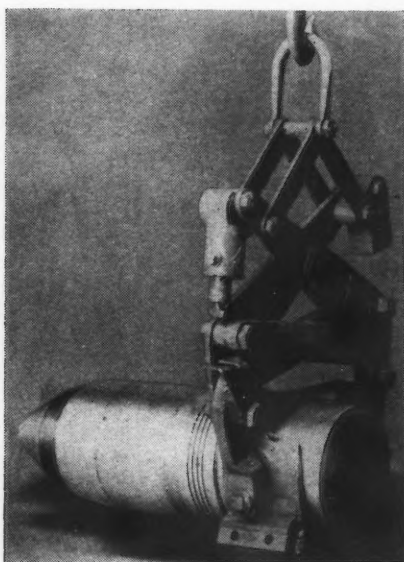
By hardening direct from the heat

of rolling and then tempering, an improvement of 93 to 140 ft.-lb. per sq. in. in the notched bar impact values was obtained. The danger of cracking due to quenching the unevenly heated bars was minimized by using temperature-indicating colors and withdrawing the bars from the quenching bath at temperatures between 302 deg. and 662 deg. F. An intermediate annealing was not necessary. The hardening of low-carbon steels in water with no tempering was successfully devel-

oped; in this way bars about 2 in. in diameter attained a notched bar impact strength of 373 ft.-lb. per sq. in. with a tensile strength of 176,328 lb. per sq. in. and an elastic limit of 156,420 lb. per sq. in.

Another successful method of heat treatment was a high-temperature diffusion annealing immediately after the final rolling or forging process. This prevented segregation and internal stresses without any of the detrimental effects of overheating.

F ROM horizontal to vertical in one swing: Here are views of the way Heppenstall automatic tongs are used to handle 8 and 9 in. shells, weighing about 250 lb. each. Left, shell is in horizontal position as taken from the conveyor; middle, turnover action from the horizontal to vertical position; right, shell in vertical position ready to be deposited on the shot blasting chamber. Built for 17 years as an item of special design, tongs such as these are now being produced on a mass production basis by the Heppenstall Co., Pittsburgh. Several hundred have been supplied for the heavy shell program since the European invasion.



Bessemer Steel Production And Application

AT a recent Pittsburgh chapter meeting of the American Society for Metals a symposium on bessemer steels was conducted by C. C. Henning, general metallurgist, Jones & Laughlin Steel Corp., with a series of three papers presented by authorities in the bessemer field. Gordon Yocum, assistant to the general manager, Wheeling Steel Corp., Wheeling, W. Va., discussed "Dephosphorized Bessemer Steel"; E. C. Wright, assistant to president, National Tube Co., Pittsburgh, read a paper on

"Killed Bessemer Steel"; and J. D. Armour, chief metallurgist, Union Drawn Steel Division of Republic Steel Corp., Massillon, Ohio, gave his opinions on the "Future of Bessemer Steel for Automatic Screw Machine Parts."

Because of the current interest in bessemer steel applications and the considerable efforts being devoted at the present time to bessemer research and development, these papers are presented here in almost their entirety.

facture and deoxidation enabled the company to make a measure of the deoxidizing power and efficiency of various addition agents and also pointed out the important effect of temperature upon this chemical reaction. A thorough study of the literature on the physical chemistry of steel making permitted the calculation with considerable accuracy of the effectiveness of the available deoxidizers. The significant feature of this work showed that carbon is a very satisfactory deoxidizer and that its efficiency increases as the temperature of the steel is raised. Since bessemer steels are usually hotter than open-hearth steels, the use of carbon as a partial deoxidizer appeared even more valuable. Figs. 1 and 2 show a plot of the physical-chemical equilibria of steel at 1600 deg. C. (2914 deg. F.) and 1700 deg. C. (3092 deg. F.) which resulted from the calculations.

The most effective means of adding carbon to a steel bath is in the form of molten pig iron. In order to obtain the benefit of the carbon deoxidation it is necessary to add the carbon

Production and Characteristics Of Killed Bessemer Steel

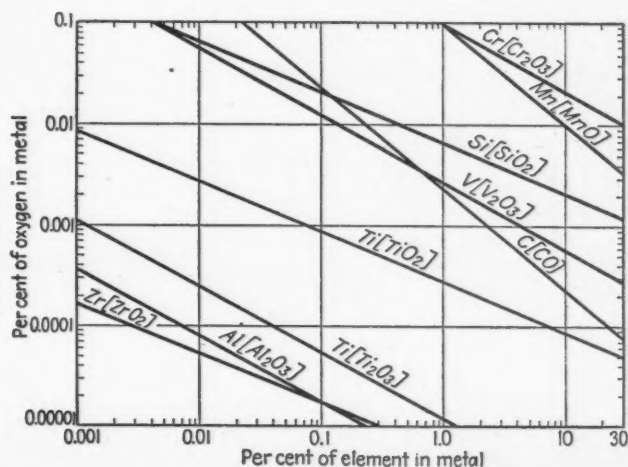
WHEN National Tube Co. abandoned the manufacture of lap-weld pipe in 1938, the chief outlet for bessemer steel was eliminated. The question arose as to whether to scrap these bessemer steel installations and build open-hearth furnaces or first to attempt making seamless tubes from bessemer steel.

Developments in the manufacture of open-hearth and electric-furnace steel for seamless tube production demonstrated that thoroughly killed or fully deoxidized steels for seamless tube manufacture gave more uniform results and better quality. Previous attempts, extending over 25 years, to make seamless tubes out of unkilled bessemer steel had nearly always resulted in failure. Consequently, it was decided that fully killed bessemer steel of good forging quality should be tried. Preliminary work on deoxidizing bessemer steel in the ladle, using additions similar to those employed in deoxidizing low-carbon, open-hearth heats, gave inconsistent

results. Although large additions of silicon and aluminum were added to the ladle prior to the manganese addition, many heats were not thoroughly killed and had erratic forging properties.

A survey of the physical-chemical conditions surrounding steel manu-

FIG. 1 — Equilibrium between oxygen and other elements in liquid steel at 1600 deg. C. (2912 deg. F.). $[FeO] = 4.49 [O]$.



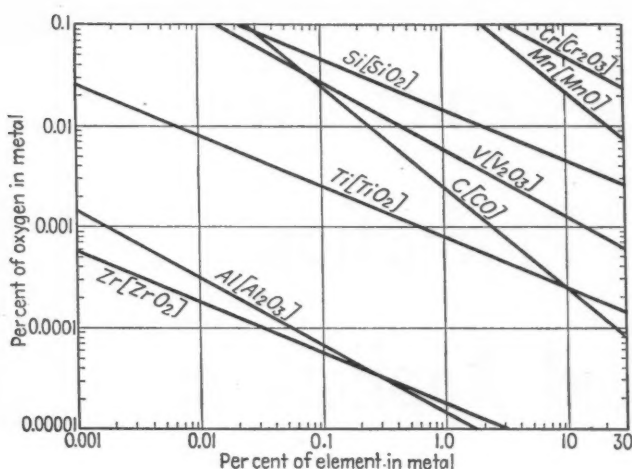


FIG. 2 — Equilibrium between oxygen and other elements in liquid steel at 1700 deg. C. (3092 deg. F). [FeO] = 4.49 [O].

to the blown bessemer metal before the addition of the standard deoxidizing agents such as manganese, silicon, and aluminum. Although numerous attempts had been made to blow the vessel in such a way that it could be turned down at some desired carbon content, the control of this appeared to be impossible, and therefore it became necessary to blow the vessel until the drop of the carbon flame. The use of spectroscopes and other instruments to control the carbon content of the blow was in all cases unreliable. As a result, the blown metal at the time the converter is turned down approximates 0.04 per cent carbon, with practically no manganese or silicon remaining. The oxygen content of the blown metal is quite high at this stage.

Assuming a converter metal of the composition just given, the problem becomes one of adding the required amount of carbon to get the carbon deoxidation reaction, and also leave

sufficient carbon in the steel for the desired analysis. Various amounts of molten pig iron sufficient to give 0.20 per cent carbon or less were added to blown converter baths, and it was soon found that approximately 0.05 per cent carbon was consumed in deoxidizing the FeO in the bath. It is necessary to add this molten pig iron in the converter and this represents one of the difficulties of the process as small amounts of molten pig iron varying from 400 lb. to 2000 lb., depending on the size of the converters and the final carbon content of the steel, must be accurately measured in order to control the carbon reaction. Bessemer operators objected strenuously to such practices, especially in one of the plants where the converters were only of 13-ton capacity. It took several months to demonstrate to them the usefulness of the molten pig iron addition.

In making a low-carbon killed bessemer heat, the procedure is therefore to blow the vessel down to the carbon flame drop, add sufficient molten pig iron in the converter to produce a carbon content after mixing of approximately 0.15, and then tap this charge into the steel ladle with the standard additions of ferromanganese, ferro-silicon, and aluminum, normally employed in thoroughly deoxidizing any heat of steel of this

carbon content. In order that this practice may be clear, Table I is shown which tabulates the additions and efficiencies of the materials added to a 50-ton killed bessemer steel heat. Although this table represents only the low-carbon type of heat, very satisfactory heats have been made up to 0.45 carbon, and it is now possible to produce killed bessemer heats with accurate carbon ranges anywhere between 0.10 and 0.50 carbon.

As soon as the carbon deoxidization reaction had been carefully conducted it was found that the heats so processed were very thoroughly deoxidized and could be poured into hot-top ingot molds and rolled into very satisfactory seamless tubes. Etch tests on bars and tubes show a dense fine grained forging structure, and the practices in seamless tube yield approach very closely to the yields obtained on open-hearth and electric furnace steel. Inclusion ratings of

TABLE II
Physical Properties of Killed Bessemer Steels

	Average	Minimum
Yield strength 0.01 per cent set.....	53,020	43,400
Yield strength 0.2 per cent set.....	55,000	45,000
Tensile strength.....	75,000	66,000
Elongation in 2 in. per cent.....	35	25

these heats also show clean steel probably due to the carbon reaction and the high temperature in the ladle. The steels made by this practice are distinctly different from open-hearth steels of the same carbon and manganese content. For seamless tube manufacture it is necessary to keep the sulphur content of these bessemer steels low, preferably under 0.05 per cent. This is also true of open-hearth steels for seamless tubes unless the manganese be raised above 1 per cent. The fact that the killed bessemer steels contain considerable amounts of phosphorous and nitrogen, generally of the order of 0.09 per cent phosphorous and 0.015 per cent nitrogen, gives these steels high strength and good welding properties. For example, a 0.15 per cent to 0.20 per cent carbon killed bessemer steel will equal a 1035 open-hearth steel in tensile properties.

During the past six years the physical properties of these killed bessemer steels have been quite thoroughly explored, and the most significant feature from a structural standpoint is the fact that steels of high

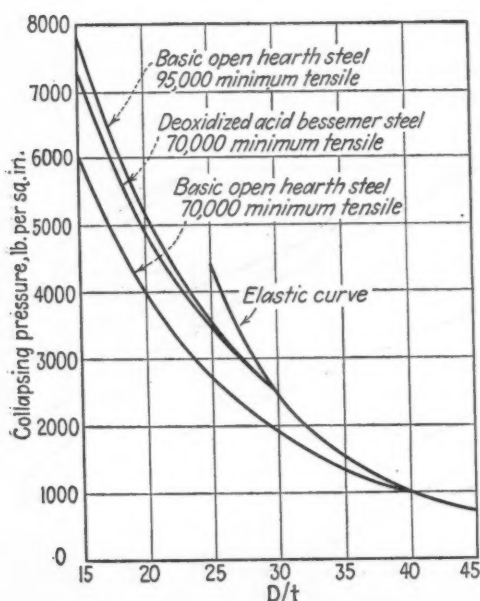


FIG. 3—Resistance to external pressure of pipe for several grades of steel.

yield point and tensile strength, with good elongation, are readily made with rather low carbon contents. These steels have a particularly high elastic limit as compared to open hearth steels of the same tensile strength, and this special property has made these killed bessemer seamless tube steels particularly adaptable to oil well casing which must be highly resistant to collapse, a property which is proportional to the elastic limit of the material used. This is shown in table II. Fig. 3 shows the comparative collapse resistance of the killed bessemer steels to corresponding grades of open hearth steels normally used for casing. The killed bessemer steels have likewise been entirely suitable for most forms of common pipe usages, and particularly for

	Blown Metal, 100,000 Lb.		Molten Pig, 800 Lb.		Ferro- manganese, 600 Lb.		Ferro-silicon, 500 Lb.		Final Heat, 103,900 Lb.		Addition Efficiency	
	Per Cent Weight		Per Cent Weight		Per Cent Weight		Per Cent Weight		Per Cent Weight		Per Cent	
C.....	0.04	40	4.25	119	7.00	42	.....	.....	0.15	156	74.00	.....
Si.....	0.008	8	1.50	42	.....	.....	48.00	240	0.21	218	74.50	.....
Mn.....	0.05	50	0.60	17	78.00	468	.....	.....	0.436	453	83.20	.....
Oxygen—0.36 per cent FeO.....	0.08	80	.....	.....	.....	.....	.....	.....	0.015	15	.....	.....

structural pipe such as is used for drive pipe, railings, masts, piling, and other uses of pipe where rigidity and stiffness are desirable.

The effectiveness of this development is well demonstrated by the ex-

perience obtained during the past six years wherein some 700,000 tons of bessemer steel ingots have been produced, and some 450,000 tons of seamless pipe and tubing have been made in all sizes from ½ in. to 24 in. o. d.

Dephosphorized Bessemer Steel Used for Many Products

THE advent of the wide hot and cold continuous strip mills for processing sheets and tinplate presented a formidable problem in bessemer steel making. Plants actively engaged in making bessemer steel and equipped with mills confined largely to the rolling of sheet and tin bar or skelp flats were forced to seek other fields of application, or change the properties to meet the demands. Open-hearth steel largely supplanted bessemer in grades supplied to cold reducing mills.

The entrance of the cold tandem mills presented a different picture with respect to phos content and its relation to cold production. Steel quality and chemistry are of more importance in producing a successful drawing sheet than in the hot pack-rolled process.

Aging characteristics became a problem partly due to chemistry and also a change in physical conditions. After final temper rolling, cold reduced sheets are probably in a state of relatively unstable equilibrium which increases the sensitivity of the steel to certain variables.

Segregation of the elements was given more attention especially in the rimmed steel grades due to the large slab ingots required for wide sheets rolled in one direction. Phosphorous with its high propensity for segregation was a problem, especially in the higher phos grades. Reduced phos and reduction in segregation was necessary to provide uniform cold rolling performance, and uniform

drawing properties and a high standard of flatness in the finished product.

Also of no little importance was the fact that the difference between success and failure began to be measured by the trade by the loss of two or three stampings, more or less, out of a hundred.

The conditions of processing and the properties of the final product demanded generally lower and narrower ranges of the usual elements and limited nitrogen and oxygen contents. Phos contents of well under 0.050 per cent became the standard to reduce work hardening and its strong unfavorable effect in the deep drawing work. Phos is added to 0.150 per cent, however, in open-hearth grades for ordinary forming work where high strength and stiffness are required in the finished product. Phos serves no useful purpose in cold reduction or final drawing quality and is currently as low as possible in most grades.

Confining the discussion to bessemer steel of 0.100 per cent phos content, it developed that the rimmed and capped grades were successfully cold reduced to gages of about 0.015 in. during the early period of relatively low speeds. As mill speeds were gradually increased from 400 ft. per min. to 1800 ft. per min. and higher, the lighter gages were difficult to produce on some mills and impossible on other mills without undue breakage and loss in yield. There remained, however, a large field of

application for bessemer steel in light gages for products in the class of consumers goods where only forming quality is involved. Regular bessemer of low C and Mn and 0.100 Ps. contents is satisfactory for such application.

The ductility improvement required to meet the conditions of processing was relatively small but difficult to obtain in all heats of normal phos steel. Individual heats of low N and 0.100 Ps. contents usually met the requirements but these were not reproducible in sufficient quantity due to lack of positive N control. The ductility requirements vary somewhat with the type of mill. At the higher speeds, mills of three or four stands require softer material than five stand mills.

In order to meet the demand for lower strength and hardness, and greater ductility, a reduction in all hardening elements was required. The C and Mn were first reduced to practical operating minimums, followed by a reduction in S content. The remaining elements to be considered were P, N and O. Thoroughly deoxidized steels were developed for non-aging properties but these killed steels are generally somewhat harder than the rimmed grades of the same analysis. It is difficult to produce a soft, non-aging steel suitable for sheets with a satisfactory surface quality and proper response to annealing at relatively low temperatures.

These factors all tended to crys-

tallize attention to a reduction in phos content.

The existence of a field for lower phos bessemer was recognized some years ago and several investigators have reported successful results in dephosphorizing the blown metal. Efforts are also in the making to produce a lower natural phos steel by the use of very low phos bearing raw materials in the blast furnace burden.

A dephosphorizing method best suited to materials situation and shop equipment and the products to be produced was developed. Since that time about 1,000,000 tons of steel of under 0.050 per cent Ps. has been made and applied to products formerly made of hearth steel, or applied as an improvement in certain other grades.

The first departure from former blowing practice had to do with the character of the converter slag. The available shop equipment did not permit reladling of the blown metal to separate the siliceous converter slag. A thick and pasty slag was required to hold the slag back in the converter as the blown metal was poured into the steel ladle. It was found that the desired type of slag could be produced regularly by controlling the Si and Mn in the iron. A ratio of 2.5 Si to 1 of Mn coupled with medium young blowing produces thick pasty slags even at the higher ranges of blowing temperature. The slag is held back in the converter by inserting a block of wood inside the jaws of the vessel at the metal level.

Dephosphorizing is accomplished by adding a mixture of lime, iron oxides and flux, all in the solid state, to the stream of metal as it flows into the ladle. The ferromanganese is added at the same time. The major portion of the phos is removed in a few seconds by the basic oxidizing slag formed, which is intimately mixed with the metal by the agitation provided. Phosphorous is eliminated at the high temperature because of the very low C content of the blown metal and the absence of Si. Phos elimination is ordinarily 50 to 70 per cent of the amount present in the metal but greater percentages can be removed if necessary with special mixtures and improved equipment. Although iron oxides are present in the mixture and the blown metal at the start of the additions, the FeO in solution in the metal at the end of the blow is reduced approximately one-half that amount when the reaction is completed. The iron oxide content of the addition is adjusted to eliminate the desired amount of phos and have sufficient FeO in solution for proper rim-

ming action of the metal in the molds.

The original mixture when melted contains about 50 per cent CaO and 30 per cent Fe₂O₃. After the reaction of the slag volume is increased slightly by silica, alumina and manganese oxide. The final slags analyze 45 per cent CaO, 10 to 14 per cent iron oxides FeO and Fe₂O₃, 15 to 20 per cent SiO₂, 4 to 6 per cent Al₂O₃, 8 to 10 per cent MnO and 4 to 6 per cent P₂O₅. The final slag volume is about 3 per cent of the weight of metal treated.

The metal is blown to a temperature of 3150 deg. F. to provide excess heat to melt the cold addition. The use of the photocell flame control equipment is an aid in proper control of these high temperatures.

At this time, the Wheeling Steel Corp. is not prepared to describe the physical properties of low phos bessemer vs. basic open-hearth steel in precise numerical terms usually followed in metallurgical procedure. A straight-line comparison of the two steels of the same C and Mn contents at different phos levels cannot be made. Bessemer steel is greatly complicated, as compared to basic open-hearth steel, by the presence of elements other than those usually specified, that have an important effect on physical properties. In unalloyed, open-hearth steel only C and Mn need ordinarily be considered in describing physical properties or as a guide in application.

Relatively small changes in phos content have a pronounced effect on physical properties with increasing N contents, especially in rimmed and capped steels. In side-blown bessemer foundry practice the N content is usually well below 0.008 per cent and the effect of phos up to 0.070 per cent has little effect on embrittlement in thoroughly deoxidized grades. In bottom-blown ingot practice the N is higher and may vary from 0.010 to 0.018 per cent in ordinary practice over a period of time.

With N of 0.010 per cent, strong aging characteristics are shown at about 0.070 per cent of phos in the open steel grades. With N of 0.018 per cent, aging and embrittlement increases rapidly with phos over about 0.055 per cent. At any given level of C, Mn and N, increased phosphorous

means increased sensitivity to aging and embrittlement. Phosphorous affects the cold workability and N increases the strain sensitivity.

These relationships of N and phosphorous are stated on the basis of trends observed during normal production, using the usual testing procedure and final performance data for the products involved. Some further improvement in investigation procedure and testing technique must be developed to measure and record them in precise numerical terms.

The grades of steel included in this discussion are applied to a wide variety of flat rolled products classed as competitive commodities. Chemical limits and physical properties are not usually specified and they are judged chiefly by performance.

On the basis of performance the 0.030 to 0.050 per cent phos bessemer steel has been established as a more ductile and more uniform final product than the 0.100 per cent P grade. The reduction in P and S contents are sufficient to insure better cold workability, better response in annealing and processing generally and less sensitive to aging and embrittlement. Regular bessemer converted to lighter gages by modern high-speed cold-reduction methods has directional properties which cannot be eliminated by heat treatment at the usual temperatures.

The physical properties of as-rolled low-phos bessemer, compared with open-hearth and 0.100-phos bessemer, are as follows:

Hardness

Rockwell hardness values are higher and in a wider range than low phos open-hearth, but are lower and in a narrower range than normal bessemer.

Elongation

In per cent elongation, an accepted measure of ductility, it is lower and more variable than open-hearth, but higher and less variable than normal bessemer.

In the same section the average values are shown in the table below for light gage, flat rolled material in the as-rolled condition.

Yield point

The yield point is higher for a

Ductility of Open Hearth and Bessemer Grades Compared

	ELONGATION, PER CENT
Rimmed low-phos open hearth 0.030 to 0.050 phos bessemer (cap'd) 0.100 phos bessemer (cap'd)	30 per cent in 8 in. 28.5 per cent in 8 in. 25 per cent in 8 in.

given ultimate strength than open hearth, but lower than normal bessemer.

Ultimate strength

The ultimate strength is higher than low C low phos open hearth and lower than normal bessemer.

In comparison with low C and Mn capped open-hearth steel, the capped 0.030 to 0.050 per cent Ps. bessemer has physical properties similar to an 0.070 to 0.080 per cent Ps. open-hearth.

The list of approved applications for dephosphorized bessemer is limited in Wheeling's case by the type of rolling equipment to flat-rolled products and welded pipe.

Cold-reduced products

In cold-reduced sheets no attempts have been made to enter the open-hearth field of deep and extra deep-drawing grades of any gage. The major portion of the low-phos steel available for the mild drawing and forming grades is applied to gages of 0.009 in. to about 0.020 in. in thickness. The largest application within this group is for 0.015 in. gage sheets for galvanizing followed by corrugating, V crimping, and channel drain crimping operations. In comparison with the regular bessemer, its superiority is measured first by the ability to be cold-reduced to this light gage at speeds competitive with open-hearth sheets. Regular bessemer will not meet these requirements. The lower and more uniform phos content and especially the lower phos in the segregated central zone in the ingot and hot bands is the major factor in this performance. Secondly, is the better response to annealing which removes the directional properties to a degree not possible with normal bessemer with limited temperature annealing facilities. Finally, in the finished product, the degree of work hardening and aging is reduced sufficiently to insure the formation of uniform corrugations and V crimps and a very necessary high standard of flatness between crimps. Both grades of bessemer are very satisfactory from the standpoint of uniform spangle and tightness of coating.

Galvanized sheets

For galvanized sheets the low-phos bessemer is applicable in gages of 18 to 30 gage inclusive. Normal bessemer has an extremely limited application in this group due to lower cold tandem mill performance in the lighter gages and a propensity to cracking in brake forming, mild drawing or high speed lock seaming operations in the heavier gages. During

the transition period of changing from hot pack-rolling to cold-reducing methods the low-phos bessemer was applied without reservations to commercial galvanized sheets. Hot-working and cross-rolling contributed to the elimination of directional properties and strain sensitivity.

Black plate

In this group it is applicable to light gages, 0.010 in. to 0.015 in. The requirements are uniform bending and forming quality in either direction and mild drawing properties. The applications are bodies and shallow drawn bottoms for galvanized pails, tubs, garbage cans and the like. Compared with open-hearth grades of the same gage and processed along parallel lines the Olsen ductility values are about 8 per cent lower and the hardness about 12 per cent higher. Accelerated age-hardening tests show the same comparative figures.

Blue iron

The application in this group is in gages of 0.014 in. and under for fabrication of folded end pans and shallow drawn pans, drum heads and barrel heads. As compared with open-hearth steel of the same gage, the Olsen values are lower and the hardness values higher. Where open-hearth and low-phos bessemer are processed to the same gage and temper rolled to the same Rockwell hardness the 0.030 to 0.050 per cent Ps. bessemer shows lower elongations, e.g.; 25 per cent for open-hearth steel, 20 per cent for low-phos. bessemer.

Building materials

In this group, to mention a few, are channels, studs, partition bars, long span flooring, ridge roll, conductor pipe and trough stock. These are made from both hot and cold-reduced stock of 0.015 in. to 0.110 in. in thickness. The requirements are the ability to withstand high-speed roll-forming operations and a satisfactory stiffness in the finished product. The low-phos bessemer is applicable to these materials without reservations.

Airplane landing mats

The low-phos bessemer is an officially approved application for plank type landing mats of the punched and extruded type. Normal bessemer withstood the fabricating process satisfactorily but failed in the impact tests at temperatures below 32 deg. F.

Welded pipe

In welded pipe the low-phos bessemer has useful properties of ductility for certain applications. In conduit pipe, for example, the bending moment of a 12-in. section is 98 lb.

for the low-phos, 115 lb. for normal bessemer, and 85 lb. for low-phos open-hearth steel. After hot-dip galvanizing the low-phos bessemer has better ductility and lower hardness values and equal strength of welds as compared with normal bessemer. It is also applied to coiling and bending pipe grades for ammonia and refrigeration purposes, well tubing and some smaller sizes of boiler tubes.

In electric welding the low-phos bessemer is superior to 0.100 per cent Ps. grade due to imparting less hardenability, strain and grain growth in the area adjacent to the weld.

In a discussion of low-phos and high-phos bessemer steel, the word *quality* creeps into the picture, either stated or implied, in practically every comparison of physical properties made of the two grades. *Quality* as applied to steel has little significance except when considered in connection with the intended use of the steel. Sulphur, for example, is considered an undesirable impurity in steels for certain applications, but it is added intentionally to some open-hearth, and bessemer grades for specific purposes.

With the exception of welded pipe, the products described here are benefited by a low-sulphur as well as a low-phos content. Sulphur is held to the desired level by the application of a soda ash desulphurizing treatment as the iron is cast at the blast furnace, or when poured from the mixer, or at both locations when necessary. This control of sulphur is an additional tool for quality control in either the low or higher phos grades and sulphur content of under 0.040 per cent can be purchased in either grade where it is of benefit in the finished product.

Dephosphorization is handled in a similar manner, i.e., all grades are not dephosphorized and it is applied where lower strength and hardness and greater ductility is required. Where strength and rigidity are desired and the ductility requirements are not great the higher phos grades have their fields and are so applied.

In some applications to consumer goods, such as containers for various uses, the low-phos bessemer has certain advantages over the open-hearth grade. The ductility is sufficient to withstand the conditions of processing and fabrication and the final product has a desirable stiffness and rigidity to resist collapse during rough handling. This property of stiffness coupled with satisfactory ductility makes it possible to produce certain articles in a lighter gage than with open-hearth steels. The lighter

gage is beneficial in the drawing and forming operations.

The added stiffness is also of benefit in the final cold-tempering rolling of sheets. Open-hearth plate, for example, may require a 5 per cent cold reduction in temper rolling to obtain the desired properties. The same requirements are met with low-phos bessemer after only 2 per cent reduction.

The low-phos bessemer steel has contributed to the war effort in many

ways which are limited only by the capacity of the steel plant producing these grades. Bomb fins, bomb fin crates, landing mats and the like are direct applications to the war effort. In the wide field of consumers goods it is applicable to many articles of everyday use, which has released an equivalent tonnage of open-hearth steel for other articles of war.

Due to the nature of the dephosphorizing slag this process has been restricted to the making of low-carbon

grades of open steel. Reladling is required to produce the higher C and Mn grades and Mn grades in the fully deoxidized condition.

This grade of bessemer steel is applicable to many items other than the flat-rolled products described here. There is a large field for it in rods and wire and cold drawn bar stock. In products where a certain balance of free machining and cold working properties are required it should find a wide application.

Future of Bessemer Steel for Automatic Screw Machine Products

BESSEMER steel and the bessemer process are probably the most maligned of anything in the steel business, and the author, for one, has always resented uncomplimentary remarks about bessemer steel being the rottenest steel there is and that it should be used only when there is no need to care about strength and toughness. There are a great many applications where bessemer steel is not only the equal of that made by other processes, but is decidedly superior. Perhaps the best example of this superiority is in the field of machinability.

Bessemer screw stock still maintains a superiority in the machining field, although metallurgists have been trying for years to attain equal machining properties with steel made in the open-hearth furnace and even in the electric furnace. In their efforts to equal the machinability of bessemer steel, they have added everything to open-hearth steel they could think of, including fertilizer, and the author does mean fertilizer. An old open-hearth man said recently that he had been hearing about this ferromanurium for a long time but never expected to see the day when some one actually told him to put it in the steel.

Despite all these competitive efforts, bessemer steel retains its superiority in the machining field, regardless of the fact that relatively little has been done to improve the machining properties of bessemer steel itself, except to keep raising the sulphur slightly from time to time as other steels attempted a competitive encroachment. This does not mean, by any means, that nothing can be done to improve the machining properties of bessemer steel. The possibilities of improving the machining properties by intelligent metallurgical research are great, when and if bessemer gets crowded too closely by various future developments in open-hearth free-machining

steels. However, bessemer is a very superior machining steel, and there is not much danger of it being supplanted by open-hearth grades in the near future merely from a machining angle.

Now, consider some of the applications of bessemer steel that might surprise those individuals who have been trained to think of such steel never being used if the service conditions are in any way severe. Only a few of the many applications of bessemer bar stock have been chosen.

Consider the use of bessemer steel for bearings. One such application is the bearing part for the bicycle coaster brake and front wheel hub. A bicycle hub is a carburized part, and, in addition to being the hub of the bicycle wheel, also forms the outer race of the ball bearing. These bearings must withstand quite severe service conditions. In addition to bicycle hubs, these are also bearings for roller conveyors and other applications, where bearing pressures are light. For these case-hardened bessemer steel is successfully used both for cup and cone of the roller bearing.

Aside from case-hardened bearings, bessemer steel is successfully used for a multitude of surface-hardened parts. In fact, statistics show there is a greater tonnage of bessemer bar stock used for surface-hardened parts than any other grade of steel. Take the case of gears. Bessemer steel is used for small case-hardened gears in cash registers, adding machines and other types of business machines, because it makes the best gear and not because it is the cheapest steel to use. The low core hardness obtained with bessemer steel for carburized parts makes it ideally adapted to small fine-tooth gears. Also worthy of mention are the small pinion gears which are used in clocks and many delicate timing mechanisms that require minute gears with a perfect finish on the

teeth. Bessemer steel is also used for gear hubs for fiber or micarta gears.

Another application is the hubs for belt pulleys for refrigerators, washing machines and similar equipment. In this case, the hub must withstand a severe cold upsetting operation after the two sheet metal halves of the pulley are assembled with the hub. Shotgun barrels and rifle barrels are uses of bessemer bar stock that might well surprise those who have been educated to shun bessemer steel for critical applications. An example of bessemer steel used for cold spinning operations is the thimble stock in the textile industry, which must withstand a severe cold spinning operation without cracking. An unusual use of bessemer steel is in type for typewriters and other business machines. Bessemer steel is used in this case because it will make a clearer cut impression of the characters than any other steel.

Many other interesting parts may be added to this list, such as radio loud speaker cores, sewing machine parts, shackle bolts for automobiles, and hydraulic brake hose couplings.

While at present the field of applications for parts made from bessemer steel bar stock is very large, it is believed there are a great many uses where bessemer steel could be used to advantage as a replacement for other steels. Such changes of grade, of course, should not be made without careful study of the service requirements of the part and after consultation with the steel supplier.

There is much that can be done through research and investigation to improve the quality of bessemer steel and thus enlarge the field of application. Improved soundness might be obtained by a study of deoxidation practices. Improved impact properties might be obtained by such means as dephosphorizing. For cold-drawn bessemer bars, improved impact prop-

erties can be obtained by stress-relieving treatments or full-annealing treatments after cold drawing. The effect of alloy additions to bessemer steel is also a field that has been touched on only lightly and may have considerable possibilities. Some work has already been done along these lines and, undoubtedly, considerably

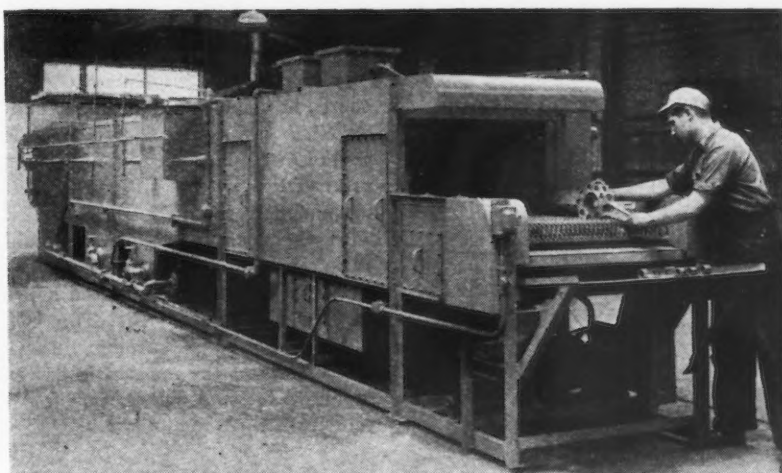
more will be carried out in the future.

In summing up the case for bessemer bar stock, the bessemer process is a quick, efficient and economical method of producing good quality steel. Its field of application is large at present, and there are many uses where it is to be desired in preference to other steels at any price. The field

of application of bessemer steel can undoubtedly be greatly increased by intelligent metallurgical research. For these reasons, it is felt that the future of bessemer steel, as far as bar stock is concerned, is very secure, and it will not only hold its own but with proper development it could substantially expand its sphere of supremacy.

Conveyor Degreaser Made Fire-Safe

THIS solvent type washing machine with a Kidde built-in system is automatically protected from fire. Along the side are the conical nozzles which carry high pressure carbon dioxide to the inside of the machine the moment the first flame appears. Parts placed on the mesh conveyor are given two baths and a rinse in Varsol or kerosene and reappear degreased and dried at the unload end of the washer. High in the hood of the machine are mounted heat actuators which, immediately at the outbreak of fire, relay an impulse which instantly causes the release of the carbon dioxide from a steel cylinder. The gas quickly blankets the flame and



simultaneously pressure operated trips close all vent openings on the top of the machine and louvers in the exhaust duct. The motors on the fan and pumps likewise are immediately

shut off by a pressure operated switch. A control handle on the carbon dioxide cylinder makes possible the manual operation of the fire-fighting system in case of emergency.

Phosphate Coating Aids Drawing of Steel Wire

MORE uniform appearance of the wire, increase in die life and increased mill tonnage because of less downtime to change dies is said to result from the application of the Oakite CrysCoat process in the drawing of ferrous rods and wire. The purpose of producing a phosphate coating on the steel is to interpose a tenacious, chemically developed parting layer between the metal and the die which will provide added lubrication to the latter. The microscopic coating formed has a fine grained crystalline structure which has the property of retaining the usual die-lubricants and carrying them to the point of deformation. The coating is so thin that it causes no appreciable dimensional or weight change. After treatment, the physical appearance of rods or wire is only slightly different from that of clean pickled steel.

The specially formulated material used in the process is CrysCoat No. 86, supplied by Oakite Products, Inc., 22 Thames Street, New York 6. It

is of an acidic nature, supplied in powder form and is completely soluble in water. Concentrations employed vary depending on water characteristics and other factors. In addition to producing a crystalline coating on rods or wire, the material also has marked detergent properties which remove light soils and much of the smut remaining on rods and wire after the pickling bath.

Clean rods or wire are immersed in hot solution contained in a welded black iron tank or wooden tank of adequate size. Concentration of solution ranges from 2 to 4 oz. of Oakite CrysCoat No. 86 to each gallon of water. Temperature of solution should be maintained at from 140 to 160 deg. F. Closed steam coils for heating solution are recommended.

The pH of the solution should be held within a prescribed range of from 5.00 to 5.7 since it has a definite bearing on size of the crystals formed. The pH of the solution may be determined by means of a LaMotte color comparator and restored to the

correct range by suitable additions of recommended Oakite material.

The sequence of operations is as follows:

1. Pickle work as usual
2. Rinse
3. Immerse in solution of Oakite CrysCoat No. 86 for 8 to 10 min.
4. Remove and thoroughly rinse or air dry
5. Lime coat
6. Bake
7. Draw

With regard to operation No. 4, a rinse is always recommended where space can be provided in the production line, since the removal of carbon smut left on surfaces after the pickling bath is aided by rinsing and results in less wear on the dies.

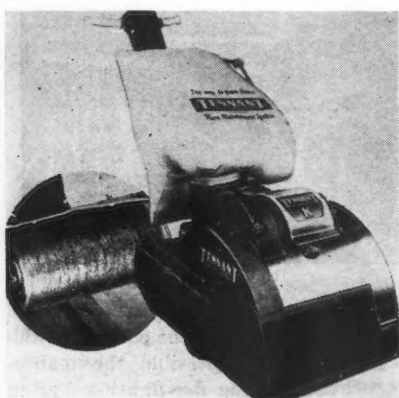
While the CrysCoat process adds another step in the production line and slightly increases cost by approximately 10c. a ton, it is offset by the improved appearance of wire, reduced die cost per ton, and by lessened downtime of wire drawing machines.

New Equipment . . .

Plant Service

. . . Recent developments in auxiliary equipment for the metal working shop are described in the following pages.

FOR dry cleaning of strip wood floors in one operation, a heavy duty floor machine, fitted with a special 16 in. factory wound steel wool



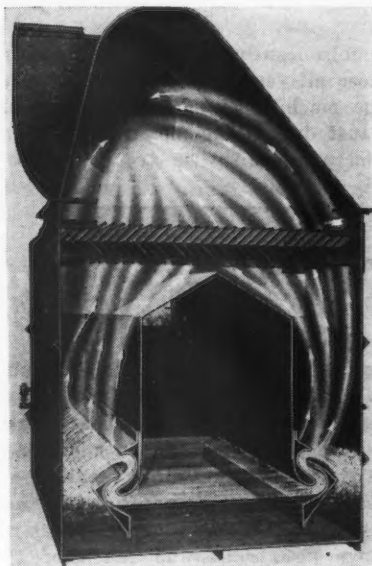
roll has been announced by *G. H. Tennant Co.*, Minneapolis, Minn. Through a vacuum system powered by an 11 in. fan, light soilage is drawn into a large heavy fabric bag. Heavy soilage is thrown into a large removable hopper by centrifugal action of the steel wool roll. Attachments include a cylinder for floor sanding, a fiber brush and a steel wire brush for cleaning heavy duty industrial floors.

Sweeping Magnet

A SWEEPING magnet for use inside or outside of factory areas, parking lots and similar places where scrap metal may be a hazard for rub-



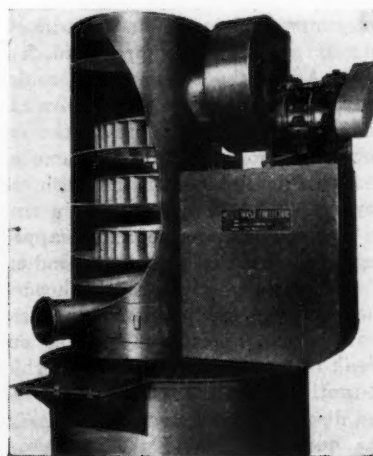
ber tired vehicles has been announced by *Stearns Magnetic Mfg. Co.*, Milwaukee 4. The unit consists of a drum with an 18 in. working face permanently magnetized to do away with the need for energizing cables. The accumulated scrap metal is picked up by the magnetic drum and deposited in a tray back of the drum which can be emptied at suitable intervals. The handle of the magnet is designed to allow for pulling or pushing the vehicle.



Dust Collector

BASED on the principle of hydrostatic precipitation, the Type N Roto-Clone has been added to its line of dust collecting equipment by *American Air Filter Co., Inc.*, 215 Central Avenue, Louisville 8. The air is cleaned by a combination of centrifugal force and intimate inter-mixing of water and dust laden air. The air, forced through the passage of the stationary impeller, induces a heavy sheet of water to move along the surface of the impeller blades creating a water curtain in the form of a reverse "S" through which the air must penetrate. It is manufactured in three classes and 13 sizes for the exhaust

of air volumes from 1000 to 25,000 cu. ft. per min.



Wet Method Dust Collector

A SELF contained wet method dust collector, the Schneible Type "EC" Multi-Wash collector which combines in a single unit all the functions of the larger central dust and fume control system has been announced by *Claude B. Schneible Co.*, 2827 25th Street, Detroit 16. The equipment consists of a 3½ impingement stage multi-wash dust collector, a suction fan, a sludge settling tank, a recirculating pump, a sludge settling tank and an after-filter.

Vertical Pumps

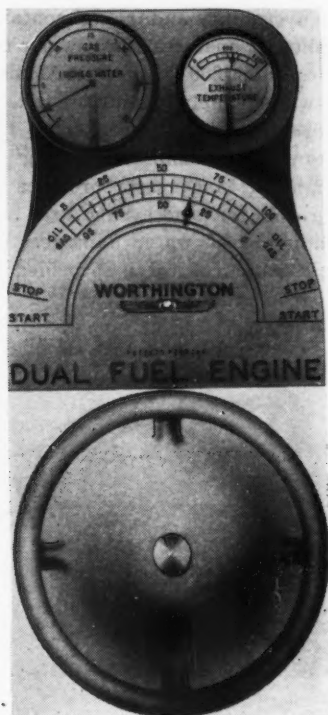
WEARPROOF pumps built in the vertical discharge model, illustrated, have been developed by *Claude B. Schneible Co.*, 2827 25th Street, Detroit 16. The pumps are particularly adapted for handling slurries, sludges, abrasive materials and dirty water. They are available



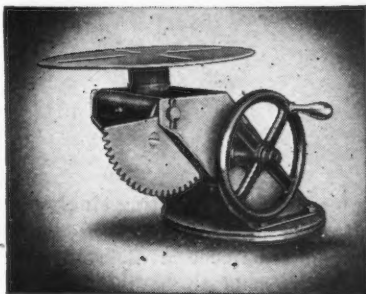
in sizes from $\frac{3}{8}$ to $1\frac{1}{4}$ in. Motors are furnished to suit requirements. As this pump is designed for sump application, the housing is made of abrasion resisting material and the housing top or cover is designed to serve as a strainer. The drive shaft is totally enclosed and protected by a quill tube which serves as a structural member and is secured to the mounting plate and the housing top.

Diesel Gas Engine

AN engine capable of conversion from oil to gas fuel without change in load or speed has been announced by the *Buffalo Works of*



the *Worthington Pump and Machinery Corp.*, Harrison, N. J. Regardless of the fuel being used, the engine operates on the Diesel cycle. A pressure of 2 in. of water is used for the gas supply. When operating as a gas engine, pilot oil ignition is used, eliminating electric ignition. Fuel consumption as a gas engine is appreciably less than that of a similar engine operating on the conventional spark ignition Otto cycle. Although the flexibility of this system makes it applicable to many fields, it is most ideally suited for use in sewage plants, oil fields, industrial and municipal plants, gas utilities and refinery services.



Bench Model Positioner

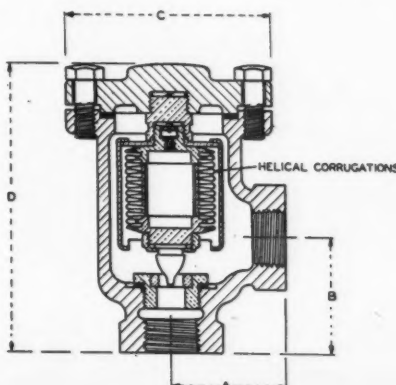
A BENCH model positioner for welding, assembly, maintenance and repair shops has been announced by *Ransome Machinery Co.*, subsidiary of *Worthington Pump and Machinery Corp.*, Dunellen, N. J. Capacity of the positioner is 100 lbs. with the center of gravity 3 in. above the table. It has a tilting range of 150 deg., revolves 360 deg., and can be locked in position at any degree of tilt. The 16 in. table top is equipped with $\frac{9}{16}$ in. slots.

Oil Concentrate

AN oil concentrate under the trade-name "Gibraltar Oil Concentrate" has been announced by *Hood Refining Co.*, 194 North Hamilton Avenue, Greensburg, Pa. It is said to thoroughly mix with any type of lubricating oil. It will not settle out or segregate and cannot be extracted by any filter. It prevents formation of hard carbon on valves and rings when used on air compressors and internal combustion engines. It is said to give better spreading or wetting action to the lubricant treated and to penetrate to the pores of the metal. Because of its wetting ability and heat resisting properties, the concentrate reduces the consumption of oil on air compressors.

Thermostatic Steam Trap

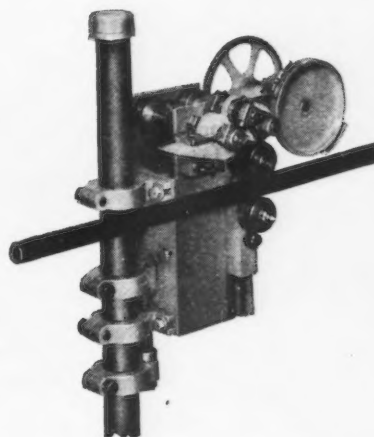
SUCCESSFUL manufacture of bellows from heavy wall bronze tubing has made possible the introduction



of a line of Sarco thermostatic steam traps for pressures up to 225 lb. per sq. in. using single large diameter bellows for inlet sizes $\frac{1}{2}$ to 2 in. inclusive and with capacities double those of the company's No. 9 series, according to an announcement by *Sarco Co., Inc.*, 475 Fifth Avenue, New York 17. The traps are available in two pressure ranges No. 9-100 for pressures 0 to 100 lb. per sq. in. and No. 9-225 for pressure 0 to 225 lb. per sq. in.

Automatic Tube Printing Unit

AN automatic unit that prints identification on tubes, bars or extruded shapes in continuous lengths or cut-off sections has been announced



by *Superior Type Co.*, 1800 West Larchmont Street, Chicago 13. It can be mounted following welding or extruding machines, or preceding cut-off units if desired. Lineal velocity is up to 240 ft. per min. The unit is adjustable for stock up to 4 in. wide or 4 in. in diameter. A 6 in. diameter printing head permits maximum length of copy of approximately 18 in. or repetition of short lengths of copy of any intervals desired. Width of copy should not exceed a total of 30 deg. on each side of the vertical center line of tubular stock.

Carbon Remover Pellets

A TIME - saving supplementary treatment for chemical processes now in use for removing carbon from aircraft, automotive and diesel engine pistons and other parts has been announced by *Turco Products, Inc.*, Los Angeles and Chicago. While prolonged soaking in specialized chemicals is normally required to completely remove tenacious deposits, a comparatively short-time bath is now

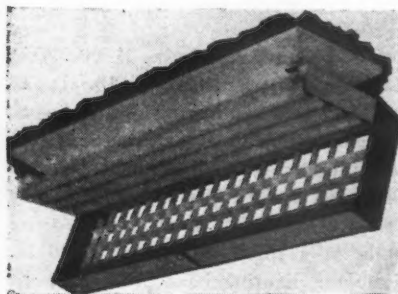
said to suffice where Carboblast is used since it is said to knock off the residual carbon, oxides and gums. Conventional sand blast equipment is used. The Carboblast pellets of lignocellulose are softer than any metal used in engine construction and cannot scratch or mar mirror-surfaces. Because of this and because the pellets are essentially non-adherent as well as smooth and non-abrasive, there is no necessity for masking off bearings, bronze bushings or for plugging spark plug holes.

Stencil Brush

A PEN action fountain stencil brush has been announced by *Diagraph-Bradley Stencil Machine Corp.*, 3745-55 Forest Park Boulevard, St. Louis 8. The brush has fountain pen action with a continuous controlled flow of ink. The brush, which is of aluminum, will work with any stencil ink on the market. It is designed with a fender guard to prevent ink on the bristles from getting on clothing, tables, etc., when the pen is laid on its side.

Fluorescent Lighting Fixture

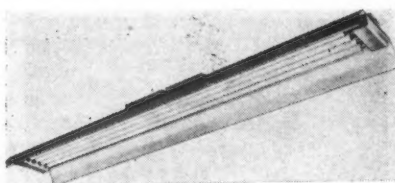
A FLUORESCENT lighting fixture equipped with the E-Z servicer has been announced by *R. & W. Wiley, Inc.*, Dearborn & Bridge



Streets, Buffalo 7. The fixture is made in four models including both ribbed glass glare shield and louvered types, industrial and commercial designs with two, three and four tubes and starter or instant type ballast. The fixture is hinged so that one man can open it for cleaning or changing tubes.

Cold Cathode Fixtures

A LINE of industrial cold cathode fluorescent fixtures employing the 93 in. low voltage Colovolt lamps has been announced by *General Luminescent Corp.*, 638 South Federal Street, Chicago 5. The enamel fixtures may be had in two lamp and four



lamp models for mounting singly or in continuous lines. The fixtures employ the standard 10,000 hr. Colovolt lamps which are said to be instantaneous in starting and do not flicker.

Flanged Metal Hose

A DETACHABLE flange for helical flexible metal hose in sizes 2, 2½ and 3 in. in diameter so designed as to permit repeated reuse has been developed by *Packless Metal Products Corp.*, New Rochelle, N. Y. No brazing is required and no gasket is employed to connect the flange to the hose, making a metal to metal seal.

Stainless Steel Flexible Tubing

THE addition of a 6 in. in diameter size to its line of stainless steel flexible tubing has been announced by *Chicago Metal Hose*, Maywood, Ill. The tubing is a corrosion resistant, liquid and gas-tight flexible metal tubing.

Fireproofed Clothing Service

A LAUNDRY and fireproofing service for workers' clothing has been announced by *Universal Safety Equipment Co.*, 700 S. California Avenue, Chicago 34. Ordinary work clothes become fire resistant when processed with *Flamesafe* compounds. The compound will not leak out of the material except by thorough washing and the material will not be made stiff, brittle or sticky but will keep its natural softness.

Protective Wear

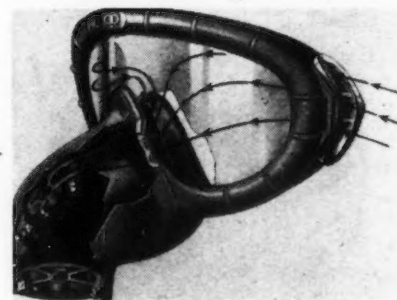
A LINE of Ply-Garb clothing affording protection against oils, acid, caustics, water, dust and fumes has been announced by the *Milburn Co.*, Detroit. One of the chief advantages of Ply-Garb is claimed to be the fact that it affords maximum



protection against every common hazard with a minimum of weight. The clothes are fabricated from cotton duck, specially processed with plastic and are available in both single and double coated fabrics for both ordinary and heavy duty wear.

Fire Fighter

DESIGNED to travel down narrow aisles on a moment's notice and to reach ordinarily inaccessible fires in seconds, a mobile fire fighter has been developed by *F. A. B. Mfg. Co.*, Oakland, Cal. It is mounted on a gasoline powered truck, Model FF "Chore Boy," manufactured by *Buda Co.*, Harvey, Ill. Features of the fire extinguisher include its unusual maneuverability and its self-contained supplies. It operates 120 gal. per min. and contains 200 ft. of hose. While its own water supply is being used, its 1½ in. fire hose can be connected to a hydrant. A combination "fog" or straight stream nozzle provides for using fog for smothering fires with a minimum of water damage. One simple hand control is provided for the steering mechanism.



Fog-Free Goggle

A GOGGLE which harnesses normal breathing to make a natural ventilating pump for itself so that it cannot cloud up or fog, regardless of how much the wearer perspires, has been announced by *Polaroid Corp.*, Cambridge 39, Mass. Normal breathing sweeps a complete change of fresh air in front of the wearer's eyes at about once every second. Inhalation draws air through the intake ports of the goggle. The air then sweeps across the inside of the lens and passes through an inlet valve into the nose. Exhalation closes the inlet valve and opens the outlet valve in the base of the protruding nosepiece.

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ACCURACY . . . Hardinge Engineered Form Tools produce correctly . . . immediately, with a desired part finish and with more pieces per grind.

In spite of ever increasing demands for Hardinge Engineered Form Tools, you are assured of the Hardinge Special High Speed Steel, Heat Treatment, Ground Finish and Hardinge Accuracy.

Why Hardinge Form Tools are preferred:

1. Hardinge Special High Speed Steel is available only in Hardinge Form Tools.
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3. Excellent Ground Finish . . . for better Part Finish.
4. Absolute Accuracy.
5. Longer Life . . . Lower Part Costs.
6. Supplied for any make of machine.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR



Assembly Line

■ ■ ■ STANLEY H. BRAMS

• General Motors tells foundrymen its ideas on what's wrong with foundry practice and production . . . Methods for improvement also are detailed.



DETROIT—Almost a year ago General Motors Corp. arranged a noteworthy symposium with machine tool manufacturers (*THE IRON AGE*—May 4, 1944, p. 78) intended to outline the viewpoint of the company on the qualities it sought in its equipment. Last week General Motors carried this procedure into a new field, when a panel of its standards and inspection people told the Detroit Chapter of the American Foundrymen's Association what it sought in castings-production and how to reach the objectives.

The General Motors case was presented by L. A. Danse of the production engineering staff and by three divisional chief inspectors, H. J. Havermale of General Motors Truck & Coach, S. A. Clapp of Detroit Transmission, and A. A. Weidman of Detroit Diesel. In essence their thesis was that the factor most lacking in supplier foundries was sufficient process control, and they broke down this generalization into specific details.

They pointed out that foundry pieces coming to General Motors must meet a number of specific requirements: Conformity to hardness, physical and chemical specifications; freedom from chills, shrinks, blowholes and leaks; conformity to dimension; proper condition of cleanness; and conformity to target locations specified in the print. Failure to meet such basic specifications was flatly declared due mainly to insufficient process control.

In so far as the handling of castings in the machine shop is concerned, General Motors experience is that such factors as these crop up: Cracks, many of them resulting from improper handling or improper cooling control; porosity and shrinks; blowholes; core wires; sand fins; hard spots resulting from too-quickly chilled areas; poor target-location, indicating the necessity of better target fixtures in the foundries; core mismatching and consequent misalignment; rough surfaces in core coil passages; and authorized repairs and welding—the latter an item which is quite apt to provide serious trouble for violators of federal inspection codes.

ONE reason advanced to explain why so much poor work comes out of foundries was the point that many veterans in the industry are reluctant to change their ideas on casting procedures and techniques, and that management and supervision generally do not maintain sufficient watch over details.

A characteristic applicable to many foundries, it was said, is a disregard for doing very much about quality or

content of production. Laboratory findings at such establishments, it was stated, are all but impossible to find, and this error of omission reflects itself in such poor qualities as high sulphur content beyond limitations. Carelessness in the handling of castings (admittedly in transit and at point of receipt as well as in the manufacturing establishments) is another item held responsible for substantial rejections.

Another criticism leveled at the foundries was that it is often impossible to distinguish between workers and supervision. The feeling was that when this line of demarcation is blurred, a lack of respect for supervision grows up among the men which may reflect itself in poor work.

Buildings and physical equipment in many foundries are a "disgrace to present-day standards," it was stated at one point. Inadequate lighting, dirty windows, and other factors were said to make proper inspection all but impossible in many plants; often ventilation is bad, as are safety provisions.

"Backward attitudes" on such matters as these in general on the part of

ANCESTRAL 'DOZER: *The 1917 version of the marvel of World War II was a marsh filling gadget, "for shoving dirt over dump where wagon cannot travel." Replacement of the horse with a caterpillar has taken the bulldozer into every corner of the globe.*



"SHOW-HOW"

GETS NEW SECRET WAR MACHINE WITH
123 TAPPING OPERATIONS INTO QUICK PRODUCTION

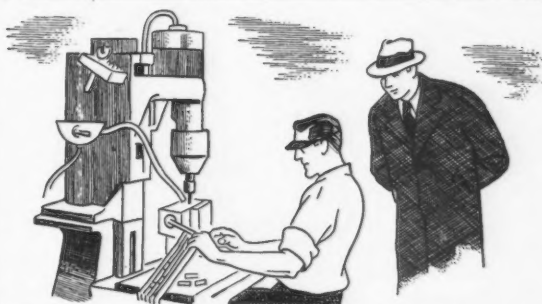
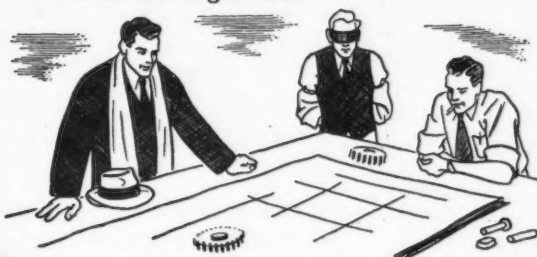
BY THE SHOW-HOW MAN

1 Leading U. S. company gets rush order for new complicated machine. Very secret. Calls "Greenfield" distributor regarding tools needed.



2 Distributor puts in hurry call for "Greenfield" man who arrives in less than two hours from nearby city. Sworn to secrecy, he is given a week to work out tool specifications for 123 tapping operations.

3 At customer's plant, "Greenfield" man studies blueprints, talks with engineers, makes notes. Finds that 123 tapping operations involve five different materials—carbon steel, alloy steel, bronze, aluminum and magnesium.

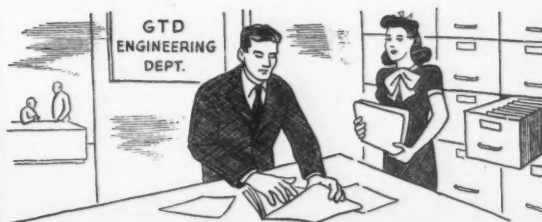


4 Next he studies machines available in customer's plant . . . notes sizes and styles . . . discusses production angles with shop engineers.

5 "Greenfield" man then prepares complete specifications for tap recommended for each of the 123 tapping operations, indicating material to be tapped and machine to be used.



6 Just to make sure, he calls "Greenfield" home office to check several of his recommendations with case histories contained in "Greenfield's" huge experience file, makes necessary changes and submits finished report . . . all in four days!



Results:

(1) "Greenfield Man" completed survey on the spot in four days instead of week. . . (2) Complete recommendations for tapping setup and tools were accepted as submitted. . . (3) New, highly restricted war product got into production without the delay of experimenting on tapping operations.

"Greenfield" SHOW-HOW is KNOW-HOW in action!
ON THREADING PROBLEMS SIMPLY CALL YOUR "GREENFIELD MAN" THROUGH YOUR "GREENFIELD" DISTRIBUTOR!



many foundry managements were advanced as one reason why foundries find it so hard to obtain manpower. The GM people pointed out that manpower and materials problems are common to all industry today, not unique in the foundries. The conditions listed, they said, act to make tight labor situations in foundries an effect of poor working conditions rather than a cause of poor quality and limited quantity of production.

That insufficient control is expensive cannot be gainsaid, and General Motors has the figures to prove it. At Detroit Diesel Division the scrap on two castings received in the rough amounted to \$128,207 in one year, while further scrapping on these during machining, which foundry defects were uncovered, represented an additional \$627,442.

THAT process control can improve the quality of castings was vividly demonstrated by General Motors early in its presentation. On one unspecified piece, machine rejections were reduced from 65 per cent to 10 per cent after a few months of close liaison between the division doing the purchasing and the casting supplier. A number of examples were cited of identical castings coming from two different foundries, in which one supplier's rejection proportion was double or triple that of the other. The General Motor's panel reported that as often as not the higher rejection total comes from the foundry longest doing such work, thus ruling out the possibility that inexperience with a particular job was responsible for the disproportionate loss. In general, a ceiling of two per cent rejections on machining is sought.

Corrective measures recommended for foundries by the General Motors people included these: Make foundries more attractive to labor by periodic cleaning and painting; keep equip-

ment in good repair; remove dirt from the floors; improve the lighting; provide good toilets and drinking facilities; enclose or put hoods around furnaces; force in fresh air and install ventilation fans; become safety conscious; provide educational programs for men and supervision; do a public relations educational job on the community at large; and, finally, treat workers as human beings.

Having made these recommendations, the General Motors people stated a policy of seeking to work very closely with its foundry suppliers. The foundrymen were urged to keep in close contact with the inspection and engineering departments, and

thereby avoid waste of time and materials by learning at once what is wanted, and, often, how to achieve it. To help these suppliers, GM usually makes a complete drawing print of each casting showing locator points and other wanted specifications.

The foundrymen had little to say in rebuttal of the General Motors claims. Some criticism was leveled at purchasing agents in general for not providing the foundries with sufficient information, but GM quickly answered this by pointing out that corporation production policy urges foundrymen to go to inspection or engineering departments rather than purchasing offices on problems of this sort.

Lincoln Discusses Employee Viewpoint

Detroit

• • • Changing the point of view of the individual worker so that he will want to do what he can, rather than want to shirk, is the secret of production efficiency and success, it was stated here by James F. Lincoln, president, Lincoln Electric Co., Cleveland, in an interview and speech to a combined meeting of the American Welding Society, the Detroit Junior Board of Commerce and the Society for the Advancement of Management.

Shaping the employee viewpoint in favor of wanting to do more can be by any of several methods, Mr. Lincoln stated—higher pay based on piece work and incentive, the realization that interests of management and men are identical, or other factors.

The only way out of current difficulties, he said, is to let management manage without government interference, so that it can devise a program for most efficient production.

As an example of his viewpoints on

the value of incentives, Lincoln described progress at his own company, where in the past several years employment has doubled, average pay has increased four times, company dividend has been more than doubled, and the price to the consumer of electrodes has been cut to approximately one-third of its earlier level.

Chrysler Employs 120,000

Detroit

• • • Chrysler Corp. now has more than 120,000 persons on its payrolls, an increase of 47.5 per cent over the 82,249 peak of peacetime. The number of plants has grown from 19 to 24, with a total of 29,741,518 sq. ft. of floor space, an increase of 80 per cent over the 16,000,000 ft. used before the war. Approximately 38,000 machine tools are in use, compared to nearly 20,000 before the war, it was reported in a statement to stockholders.

Of today's 120,000 employees, 35,000 are women—almost six times the prewar total.



SAIPAN MACHINE SHOP: For the 21st Bomber Command, to aid in the maintenance of Superfortresses, this machine shop will be a part of the complete establishment still under construction, although operations have long been under way.

IT'S IN VOLUME INSPECTION

WHERE GAGE

Wear Resistance

PAYS DIVIDENDS

A modern inspection method, illustrated at the left, employs the use of a reversible tapping head which holds a Lincoln Park Carboloy Thread Plug Gage. The part to be inspected is fed to the gage. This method of volume inspection has shown remarkable time and labor savings.

WHEREVER Lincoln Park Carboloy Thread Plug Gages have been used for volume inspection of threaded parts, they have definitely proved their lasting accuracy and economy in use. Today, hundreds of inspection operations on aircraft parts, projectile components such as fuse adapters, and innumerable other mass production parts, have been performed with tremendously increased efficiency by the use of these wear-resistant gages.

In the method of inspection shown above, as an example, only a Lincoln Park Carboloy Thread Plug Gage fully meets the requirements of the operation. In this case, the gage is subject to more than average wear and abrasion. In spite of this, the gages used retain their accuracy almost indefinitely, seldom requiring replacement. In the more conventional methods of volume inspection, too, these thread plug gages prove equally as efficient.

Lincoln Park Carboloy Thread Plug Gages are supplied in a standard size range from a No. 4 machine screw size to 3" diameters to meet almost any specifications for tolerance, lead or pitch. They can be delivered promptly. Write for full details.

LINCOLN PARK
Carboloy
THREAD
PLUG GAGES



LINCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

1729 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

• Philip Murray rumored to be putting heat on to prevent additional steel price increases in order to obtain part of 17c. an hr. demand.



WASHINGTON—If CIO President Philip Murray can put enough pressure on OPA Administrator Chester Bowles to prevent the general adjustment in steel prices promised by OPA, there may be some chance the President will approve at least part of the USWA 17c. an hr. demand, a rumor strongly believed in by labor and industry sources here. Though no confirmation or denial could be secured from the principals involved, it is reported Mr. Murray has turned on the heat.

From OPA Administrator Chester Bowles down to operating employees of the price agency there is a news blackout on this subject. The White House and Mr. Murray refused comment.

The rumor further says that CIO pressure against price increases was fathered by a deal between the higher-ups in the Stabilization Program to this effect.

When OPA granted the original interim price increases in January, the agency said that the increases were required by law to prevent out-of-pocket losses on the products affected, and officials intimated that other products were due a price boost.

What counteraction steel companies may take at this time beyond bringing the issue to the public, if the story is true, cannot be predicted.

A further increase in wages would be particularly detrimental to the financial position of small companies,

which are already suffering from the effects of the WLB's fringe awards of last November. Some small companies say they will be driven into bankruptcy unless price relief is granted.

* * *

Commercial research to discover new uses for materials and tools for which there is no ready market will be conducted soon by the RFC Sales Division under Col. Joseph Woodlock.

The purpose of the new activity will be to salvage sums above the scrap value of material which, if no use is found, would have to be scrapped.

It is planned to use the facilities of government research as well as to request information from colleges, universities, and private laboratories. The toughest problems of sale will be tackled first, but of primary consideration will be the costs of storage versus the possibilities of creating new adaptations for materials and articles which would sell above the scrap prices.

* * *

According to RFC, tool steel declared surplus by various government agencies to RFC and Metals Reserve is now a drug on the market. RFC now lists approximately \$5,000,000

worth of oil cutting and steels and the lists include most popular brands and sizes.

Overordering by the Army Navy have caused these steels in excess supply, RFC officials and government procurement agencies have not to date done any about getting rid of the surplus although WPB is considering procedure for accomplishing this.

The suggestion has been considered by RFC to sell the inventories to the companies which produced steel, but so far no program has worked out that coincides with War Department ideas.

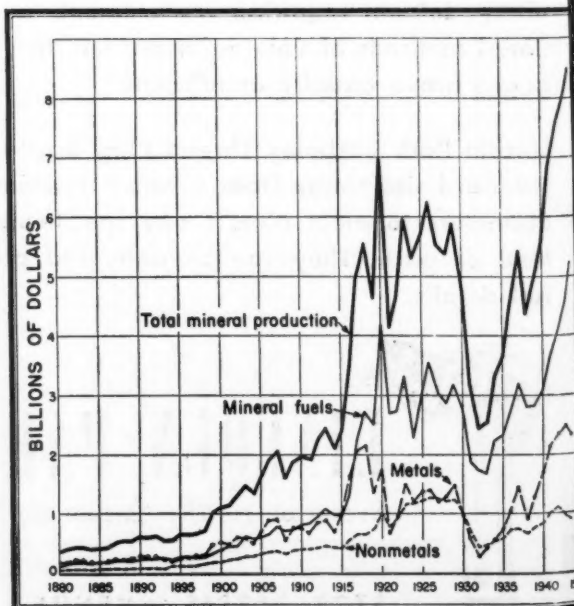
RFC's national inventories include about 4700 tons of music wire originally made for Russian lend-lease. This wire, more than three years' supply of annual needs of the instrument companies, became surplus as a result of cancellation of orders by Russia.

It ranges in original cost from a lb. to \$3 or \$4 a lb. It was bought for use in tethering barrage balloons and in making dead-falls.

RFC also has about 20,000 tons of high and low carbon Russian steel ½ in. to 4 in. wide and in practically all gages. The principal part of the tonnage ranges from 0.002 to 0.010 in gage.

U. S. MINERAL PRODUCTION:

Since 1900, mineral production in the United States has exceeded that of the entire world, says Elmer W. Pehrson, chief, Economics and Statistics Branch, Bureau of Mines. Increasing mechanization greatly increased the output per worker so that, compared with 1923, it was possible in 1944 to obtain a third more output, with a third less workers.



4 TOOLS LAST AS LONG AS 5

FINISHES BETTER...COSTS LOWER

SUNICUT...

Increases tool life by 25%...improves finishes

Turning . . . threading . . . tapping tough carbon steel, stainless steel and monel metal faster, better and at lower costs. That's the record of a large Pennsylvania shop when it switched to Sunicut.

Increased tool life and better finishes was the aim of the production manager. With Sunicut, he was able to obtain a saving of 25% in tool life, improve finishes on every operation and at the same time eliminated the necessity of various grades of cutting oils.

Outstanding transparency, high heat absorbing and excellent metal wetting

qualities of Sunicut make possible longer tool life, finer finishes and increased operator interest. This clear, transparent, sulphurized cutting lubricant has proved its production value in the leading metal working plants of America.

In your plant let Sunicut help you increase the life of cutting tools, improve finishes, and step up production. If you are faced with a metal working problem, remember there's always a Sun Cutting Oil Engineer ready to help you . . . just write

SUN OIL COMPANY • Philadelphia 3, Pa.
Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

At least 10,000 tons of surplus light alloy high silicon bars suitable for AP shot are now being examined by the Ordnance Department with a view of using them, but it is understood the decision has not been made as to whether they can be used.

* * *

In the New York RFC Surplus Disposal Division offices at 70 Pine Street are listed some items which one might find difficult to justify as surplus. One of these is 25 10-12 gage corrugated ammunition storage buildings. The buildings are 20 ft. wide, 40 ft. long and 10 ft. high, weigh 13 to 14 tons, and are in brand new condition with erection instructions and tools. They are being sold for \$500 each.

* * *

One great problem of the Disposal Division offices is special purpose machine tools. At one office there are 90 brand new diamond-cup-bearing machines which originally cost from \$12,000 to \$40,000 a piece. The same office lists 29 Van Norman ballrace grinders, also never uncanted, which cost \$38,000 each.

To economically convert these special purpose machines into general purpose ones is the object of research now being conducted.

Opening of New Route Speeds War Material From U. S. to Russia

Washington

• • • With the Nazis chased back on the defensive the first ships carrying lend-lease cargoes from the United States to the Soviet Union by way of Mediterranean and Black Sea have reached their destination, Foreign Administrator Leo T. Crowley announced recently and the reports of their performance indicate that the opening of this new route will greatly increase the speed of delivery of vital war materials to Russia. Previously shipments had to move by a much longer route to a Persian port, where cargoes had to be transferred for shipment by rail into the Soviet Union.

Much of the material now moving to the Soviet Union under lend-lease is designed to improve the Soviet transportation system, which is feeding war supplies to the troops on the Eastern Front. In the 15 months of lend-lease ended Jan. 31, the United States sent more than 10,000 separate pieces of rolling stock. Shipments of this equipment included 1278 locomotives, 27 diesel electric locomotives, 8340 flat cars, 1000 dump cars, 100

tank cars and 10 heavy machinery cars.

In addition, more than a quarter of the lend-lease steel sent to the Soviet Union since the beginning of lend-lease in October, 1941, through January is being used in the railroad rebuilding program. This has included 509,580 tons of rails, 24,350 tons of mounted sets of railroad car wheels and axles, 35,554 tons of car axles and 29,944 tons of locomotive car wheel tires and 22,020 tons of rolled steel car wheels.

Totals of lend-lease materials supplied by the United States to the Soviet Union through Jan. 31 include 12,709 combat vehicles, 1821 ordnance service vehicles, 355,059 trucks, 301,842 net tons of explosives, 157,000 guns and mortars of various types, nearly \$1,000,000,000 worth of machinery and equipment; 701,400 tons of chemicals and 3,832,985 tons of foodstuffs.

Wilson Made Special Assistant to J. A. Krug

Washington

• • • Philip D. Wilson, New York, vice-chairman of the WPB Office of Metals and Minerals, has been named special assistant to Chairman J. A. Krug to survey critical and strategic metal situations. Mr. Wilson will be succeeded as vice-chairman by William C. Keeley, who joined the WPB staff recently as production consultant to Mr. Krug.

In his new duties, Mr. Wilson will work directly under the chairman, acting as liaison official with the armed services, so that WPB may anticipate changing military demands and be in a position to assure against delays due to inadequate supplies, WPB said.

Mr. Keeley, Fairfield, Conn., is vice-president of the Air Reduction Co., Inc., New York, with which he has been associated for 24 years.

U. S. Steel Shipments Down

New York

• • • Shipments of finished steel products by subsidiary companies of the U. S. Steel Corp. for February, were 1,562,488 net tons, compared with 1,569,115 net tons in January, and 1,755,772 net tons in February, 1944.

Shipments for the first two months of 1945 were 3,131,603 net tons compared with 3,486,559 net tons in the same 1944 period.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



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The Strangers

It happened in France the other day. One of the bitterest ironies of our age of war... An American soldier—whose father had died in Flanders' fields without ever having seen his infant son—gave his life for the future of an infant son he in turn had never seen.

Three generations of strangers... and now what of the third generation? Will this child, too, grow up to inherit all the old lies, the mistakes, the weaknesses that go to make up war? What is it that his father and his father's father died for?

Already, we're dusting off the solemn aphorisms about not having died in vain, and we'll build a bright new marble cenotaph to his unknown father. But it isn't enough. Brother, it isn't enough!

We will emerge from this war the most powerful nation on earth. Our Navy and our Air Forces will be twice the size of all others combined—our manufacturing productivity will equal half the world's total capacity. If we can't enforce peace with that kind of club—and if we can't make jobs building houses for our sons to live in as well as by building tanks for them to die in—then God help us!

Today, the engineers of the basic machine tool producers stand ready to help the men of government and of industry to plan now for reconversion to a strong and prosperous America.

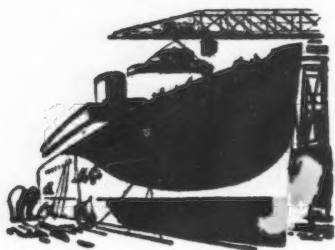
One of these is a Bryant man. We urge you to call him in today, for time is running out!



BRYANT CHUCKING GRINDER COMPANY

**SPRINGFIELD
VERMONT, U.S.A.**

• As shipyards release thousands of surplus new construction workers who hesitate to man lower wage scale battle stations, lacking labor draft, Union leaders press for removal of No. 1 area new contract restrictions.



SAN FRANCISCO—"When is a No. 1 critical manpower area not a No. 1 critical manpower area?" seems to be the question of the week here.

As the Bay Region steadily converts from new ship construction to repair, shipyard layoffs, due to reach from 75,000 to 100,000 total, have awakened labor leaders to the grim fact that they are faced with a huge permanent reduction in membership. Upshot is a demand by labor that the San Francisco Bay Region be immediately removed from the No. 1 category.

Overall war agency design is that shipyard workers be switched to meet urgent demand for workers in military establishments and transportation facilities. The difficulty of matching recently acquired skills on entirely different jobs, most of them at a lower wage scale, and the lack of a mandatory job referral system are creating a serious lag in worker absorption, resulting in demands from both labor and management that the district either be granted new contracts or be permitted to start conversion to civilian production.

WMC officials point out that the Bay Area under the Area Production Urgency Committee has always had a backlog of job orders which the region is qualified to fill—even to the extent of a 15 per cent price differential. They maintain that removal of

the No. 1 designation would not materially affect contract placement as the area remains acute for other reasons. A "Four Power" (Army, Navy, WMC and WPB) agreement prohibits conversion in under 90 days anyway, they add. Last, and by no means least, the 3000 sub-contractors affected would still be hamstrung under J. A. Krug's, the WPB head, embargo on steel and copper for civilian consumption.

With nothing to be gained immediately by restriction lifting, workers are faced with the alternative of complying with the local "Man Your Battle Stations" drive or seeking employment in critical ordnance plants in interior localities, while the government agencies hold down the hot seat and are "damned if they do and damned if they don't."

* * *

TWO long-established San Francisco Bay ship repair yards and facilities are to be combined and operated jointly as a result of the purchase of United Engineering Co. Ltd. by the Matson Navigation Co. United Engineering was founded during the last war, and has been one of the four principal yards performing voyage repair and Maritime repair jobs during

the present war. Founded by Robert E. Christy and H. P. Bray, United bought the T. J. Moynihan Co.'s boiler shops in 1920. In June, 1941, the company acquired property on the Oakland estuary and installed ways for the construction of small Navy craft and a 10,500 ton drydock.

Matson is a dominant factor in the Hawaiian Islands and for American fleets in the Pacific trade. Having handled their own repairs in peacetime, their repair division has expanded with the current war shipping boom. Matson has two outfitting and conversion docks and adjacent shops on the San Francisco side of the bay but has no facilities for construction work.

United operates a conversion pier for the Navy in San Francisco, and has had four ways in Alameda, two of which are being abandoned on completion of their present building contract. The yard is being converted to outfitting facilities and is adding a 14,000 ton drydock and has a temporary emergency ARD towable drydock. A contract for steel barges—open lighters for the Navy—is still in effect.

Change of control involves no

SUPPLIES POUR IN: Ammunition and supplies are stored on the beach at a base in the Marianas in preparation for further U. S. offensives in the Pacific areas. Shown in the background are several supply ships.



Ground Multiple THREAD MILLING CUTTERS by Continental



- A** Shell-type cutter with margin on each end
- B** Modified Acme thread form cutter
- C** Thread cutter button for Hall Planetary machine
- D** Shank-type cutter
- E** Shank-type two-diameter cutter
- F** Small diameter shank-type cutter with adapter
- G** Shank-type cutter

for fast, accurate production

Over 20 years' experience in precision thread grinding is built into CTW ground thread milling cutters . . . CTW ground thread milling cutters maintain dimensional accuracy on long production runs throughout the entire life of the cutter . . . Available in both shank and shell type, in National, Whitworth, Acme, V and special forms of thread. Many popular sizes carried in stock . . . For high production thread milling at lower tool cost, use Continental (CTW) ground thread milling cutters. Write to Continental today.

CONTINENTAL TOOL WORKS
Division of Ex-Cell-O Corporation
DETROIT 6, MICHIGAN



Continental CUTTING TOOLS

- Boring Bars and Tools
- Broaches
- Broach Pullers
- Broaching Fixtures
- Core Drills
- Counterbores and Countersinks
- CTW Drive Holders
- Counterbores (Tool Room Sets)
- Counterbore Pilots
- Inserted Blade Cutters
- Carbide Tipped Cutters
- Form Relieved Cutters
- Milling Cutters
- Thread Milling Cutters
- End Mills
- Side Mills
- High Speed Steel Reamers
- Carbide Tipped Reamers
- Shell Reamers
- Inverted Spofacers
- High Speed Steel Tool Bits
- Carbide Tipped Tool Bits
- Circular Form Tools
- Cut-off Tools
- Flat Form Tools
- Dovetail Form Tools

45-46

change in name, management or policies. Under joint ownership the two companies employ approximately 7800 people.

* * *

Petroleum coke, tantalizing, fascinating and so far unrequited hope for future metal reduction on the West Coast has bobbed up again as Union Oil Co. earnestly and energetically attempts to market from 20,000 to 30,000 tons of soft surplus coke which has resulted from their 100 octane program in southern California, from new catalytic cracking units and toluene plants. Up to now it has been burned in adjacent steam generating plants but the surplus is increasing. The coke is in small pellets and so far has not been briquetted. Small shipments have been reported as far east as Illinois. The company's laboratory and research department is working on market possibilities but so far it has been principally utilized for fuel, and in reduction where unfortunate sulphur content is not prohibitive.

* * *

Trains will soon be hauling a major tonnage of Navy material over a new 48 mile rail line from Shelton, previous terminus of a Northern Pacific branch at the southwest end of Puget Sound, up through the glacial, rough, forest covered and deep canyoned reaches of the Olympic Peninsula, past Bremerton Navy Yard to Bangor, a new port directly accessible to the

sea, where a new major Navy magazine with newly constructed igloos has been located.

Total trackage for this line was 85 miles, including passing tracks, branch lines serving Bremerton and a Naval ammunition depot north of Bremerton, and classification yard and spurs within the Bangor magazine. Relay rails were used throughout this project, obtained wherever possible. Nine different weight sections of rail came from Florida and Texas, so that it was extremely difficult to obtain materials for fittings and installation.

* * *

Principal trans-continental railroads serving Seattle and the Puget Sound are planning track replacements this Summer, for an aggregate of some \$4,000,000 including labor and all materials. Mexican lend-lease squads and war prisoners are counted on for manpower.

Great Northern will replace 12 miles of 90 lb. main line between Seattle and Everett with 112 lb. rail. Northern Pacific plans installation of 112 and 131 lb. rail on 45 miles of track between Portland and Seattle, replacing 90 lb. Milwaukee will replace some 45 miles of 80 lb. rail in eastern Washington, west of Lynn, with 112 lb. rail.

* * *

Three more practical men have been added to the Industrial & Steel Committee of the Los Angeles Chamber

of Commerce under the chairmanship of Kenneth T. Norris, tackling the problem of revised and reduced basing point differentials for mill steel delivered at Los Angeles. These are:

Earl Grover, president, Apex Steel Corp., Los Angeles; Wilbur G. Wood, chief engineer, Menasco Mfg. Co., Burbank; Ray Myers, Myers Bros., general contractors, Los Angeles.

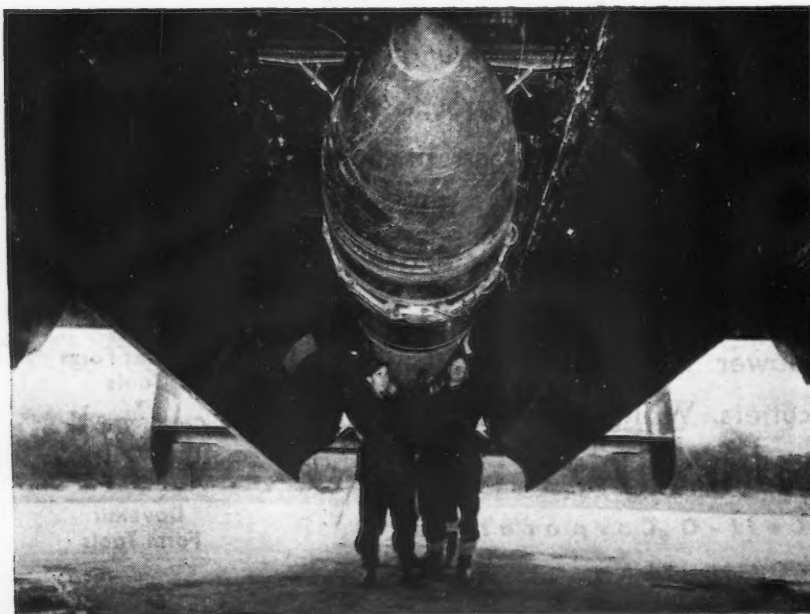
* * *

Poulsen & Narden, Inc., major southern California machine shop manufacturing cable, rod end terminals and other aircraft accessories, has been purchased by Sol Eisenrod, president of the Lincoln Machine Co. of Providence, R. I., for a reported \$1,000,000. Eisenrod will be active head of the company and C. J. Narden will remain as general manager. Sales of this Los Angeles plant last year were approximately \$7,000,000.

* * *

A comprehensive plan for the construction of 2700 miles of rural-urban limited access roads and approximately 600 miles of freeways in California's seven metropolitan areas has been formulated by a joint highway development committee and is now before the state legislature for approval. To finance the project, an increase of 1½c. per gal. in gasoline tax is proposed. The two State Automobile Associations, State Chamber of Commerce, County Supervisors Association and League of California Cities have combined on the project.

BOMB: Poised in the bomb bay of an R. A. F. Lancaster, this 12,000 lb. bomb is a special armor piercing type being used in the intensified raids on German industry accompanying Allied drives.



Belgium Interested In U. S. Machine Tools

Washington

• • • Machine tool dealers in Belgium are anxious to renew contracts with American exporters and many are said to be interested in visiting the United States to study developments in the machine tool industry, according to the Department of Commerce. Some factors in the Belgian machine tool trade believe that it will be necessary to replace 90 per cent of present equipment.

Machines tools used in Belgium before the war were, for the most part, light and low-speed machines of German origin. With the exception of lathes, it is reported that few machines in Belgium are capable of attaining the high production that is possible with the new tools steels.

Speed Up Production with **MULTIPRESS** the four-ton giant in midget form

If your war production requires up to 4-ton pressing operations . . . for staking, crimping, punching, bending, assembling, or whatever . . .

MULTIPRESS can speed it! There are mechanically and automatically controlled MULTIPRESSES. In the mechanically controlled type, illustrated here, there are three different ram actions to choose from . . . and if pressing enters into your production, one of these three actions will very likely fit it and speed it!

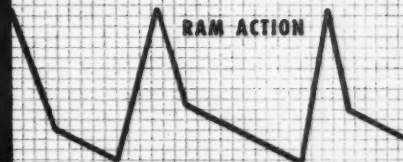
1 "Basic" MULTIPRESS offers simple, accurate and positive control of ram action through every phase of the pressing operation. Fully depressing the control levers effects rapid ram movement (200 ipm). Slow movement of the control levers affords gradual acceleration and deceleration of ram movement. Slightly releasing hand pressure upon either lever, stops the ram wherever it may be in its downward travel, and work may be positioned accurately beneath it. Releasing

Basic Unit
\$575 00

2 "Multi-Speed" MULTIPRESS offers rapid approach of ram to work, and adjustable pressing speed. Fully depressing the control levers brings the ram to the work at a speed of 200 ipm. Slightly raising the levers slows the ram at once to any



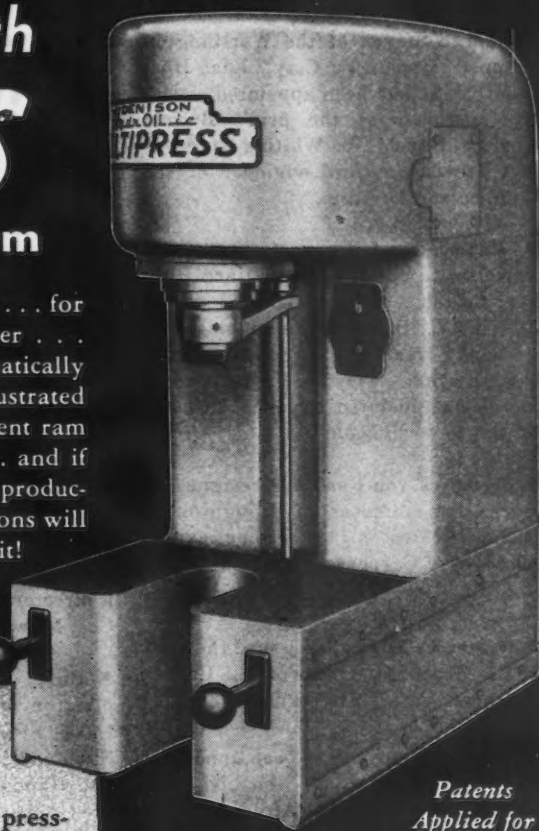
both levers causes the ram to rise to its upper limit and stop.



pre-selected pressing speed between 20 and 200 ipm. A simple knurled-knob and lock-nut permit easy and accurate pressing speed adjustment. Thus, Multi-Speed means faster production and ability to adjust pressing speed to the characteristics of the material being processed.

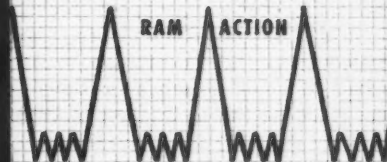
In all models, single hand-lever or foot-pedal control may be substituted for the dual hand-levers, and ram travel may be adjusted anywhere between 1/16-inch and 6 inches. Maximum daylight opening between ram and table is 11 inches. Maximum stroke 6 inches. Matching benches, table extensions, side shelves, and a variety of bolster plates are available. Write for details of MULTIPRESS, the production giant with amazing ram action control!

The DENISON Engineering Co., 1158 Dublin Rd., Columbus 16, Ohio



Patents
Applied for

3 "Vibra-Press" MULTI-PRESS is unique in its ram control and action. Depress-



ing the hand levers causes the ram to descend, exert pre-selected pressure on the work, and then make any number of repeated pressure strokes upon the work until the levers are released . . . and those strokes are precision-timed and accurately uniform as to pressure, which may be pre-set anywhere between 1,600 and 8,000 pounds. Repeat strokes are adjustable in length from a few thousandths to 1/2-inch; by means of an easily adjusted knurled-knob and lock-nut.



DENISON
EQUIPMENT in APPLIED
Hydraulics



SEND TODAY for this complete
bulletin on the new **MULTIPRESS**

• **George Steven** of the Worthington Pump & Machinery Corp., East Harrison, N. J., has been appointed executive engineer of the firm's Buffalo works. **Harold W. Whiting** succeeds Mr. Steven as chief engineer of the Compressor Division.

• **Robert H. Kittner**, formerly engineer with the American Hard Rubber Co., has joined The Glenn L. Martin Co., Baltimore, as manager of its newly created Plastics and Chemicals Division. **Clayton F. Ruebensaal** has been appointed technical director of the new division.

• **Frederick von Raab** has resigned as officer and director of Houghton & Richards, Boston, to become export manager of Carpenter Steel Co., Reading, Pa.

• **Walter F. Myers** has joined the staff of the Washington office of The Cooper Bessemer Corp., Mt. Vernon, Ohio.

• **Edward P. Joyce** has been appointed chief accountant of the Niagara Frontier Division, Bell Aircraft Corp., Buffalo, N. Y., succeeding **David F. Devine**.

• **V. E. Gumbleton**, formerly purchasing agent, has been appointed director of purchases for The Timken-Detroit Axle Co., Detroit, and **J. L. Griffin**, has been made purchasing agent for all the firm's Detroit Axle plants. Mr. Gumbleton has been continuously connected with the Purchasing Department since he joined Timken in 1918.

V. E. GUMBLETON, director of purchases, The Timken - Detroit Axle Co.



PERSONALS

• **Robert Simkins** has been appointed vice-president, Trundle Engineering Co., Cleveland, succeeding **W. S. Ford**. Mr. Simkins will be in charge of western sales, with headquarters in Chicago.

• **John L. Patterson**, formerly Chicago works manager of the Aluminum Co. of America, Pittsburgh, has been named works manager at New Kensington, Pa., succeeding **R. M. Ferry**.

• **John H. Collier**, president of the Crane Co., Chicago, has been elected a director of the Allis-Chalmers Mfg. Co., Milwaukee.

• **Harry D. Fenske** has been named director of transportation for Great Lakes Steel Corp., Detroit, its Stran-Steel and N-A-X Alloy Steel Divisions and Hanna Furnace Corp.

• **James A. Hatch** has resigned as vice-president and sales manager of the McCallum-Hatch Bronze Co. to direct the Western Sales Division of the Leed Steel Co., with headquarters in Buffalo.

• **R. O. Herbig**, since 1921 district sales manager in Chicago for the Reliance Electric & Engineering Co., Cleveland, has been appointed central western sales manager of the company.

• **M. C. Coleman** has been named sales manager of metropolitan and provincial Chicago for the appliance division of the Northwestern District, Westinghouse Electric Supply Co., New York.

• **Hugh Kelleher**, formerly war materials division manager of Owens-Illinois Can Co., has been appointed general manager of the Decoware Division, Continental Can Co., New York.

• **Arvid E. Lyden** has been appointed a director of the Patent Division, Pennsylvania Salt Mfg. Co., Philadelphia, succeeding **A. E. Gibbs**, who will continue as advisory technical director.

• **Harry A. Wehmeyer, Jr.**, has been appointed factory representative for the K. O. Lee Co., Aberdeen, S. D., throughout the state of Missouri, and the southern half of Illinois.



A. G. BUSSMAN, vice-president in charge of sales, Wickwire Spencer Steel Co.

• **A. G. Bussman**, previously assistant to the president, Wickwire Spencer Steel Co., New York, has been elected vice-president in charge of sales. In his new position Mr. Bussmann will have complete charge of all sales and merchandising operations of Wickwire Spencer and its subsidiaries. Mr. Bussmann has been associated with the company since 1930 and was successively manager of the Wire and Springs Divisions, sales manager of the Buffalo district, general sales manager and assistant to the executive vice-president.

• **E. J. Kelly** has been elected vice-president in charge of engineering, Skilsaw, Inc., Chicago; **J. L. McManus** has become secretary, succeeding Mr. Kelly and **E. B. McConville** has been elected to the board.

• **W. E. Graves** has been appointed sales manager of The Steel Improvement & Forge Co., Cleveland, and **R. A. B. Williams** has been appointed sales representative on drop, upset and press forgings for Pacific Coast states.

• **Philip E. Doell**, formerly in charge of resin and insulation material sales in the East Central District, General Electric Co., Schenectady, has been appointed district manager of the company's newly formed chemical department in the East Central District. **T. E. Giblin** has been appointed manager of the Central District of the department.

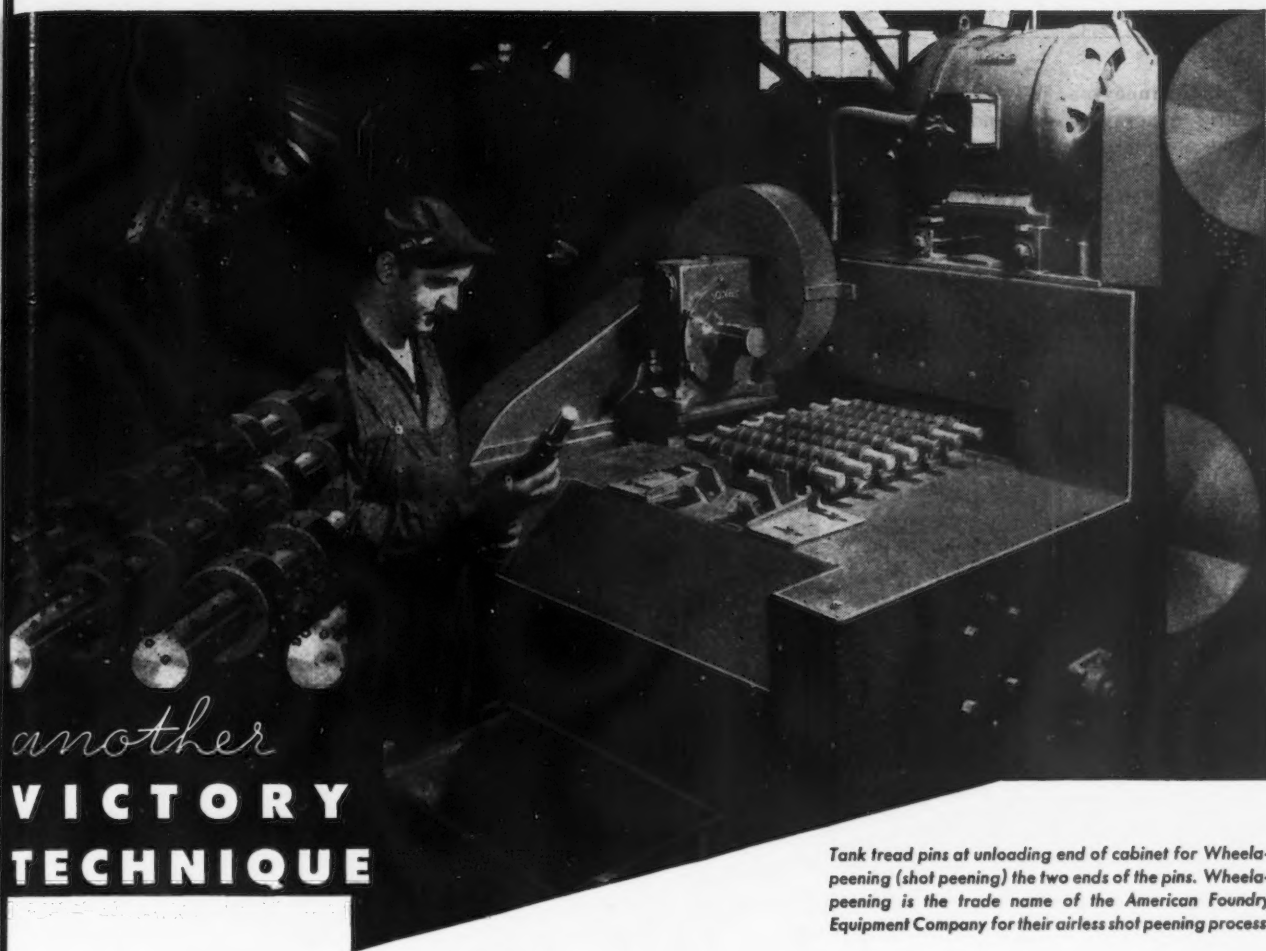
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another **VICTORY TECHNIQUE**

Tank tread pins at unloading end of cabinet for Wheel-peening (shot peening) the two ends of the pins. Wheel-peening is the trade name of the American Foundry Equipment Company for their airless shot peening process.

THESE SHOTS TOO, ARE HEARD ROUND THE WORLD

On all the world's fighting fronts, wherever our war machines are at their devastating work, are examples of this new Victory Technique that assure longer life, more dependable operation, greater fighting power.

Shot Peening is one of the astonishing developments in metallurgy that is helping us to blast our enemies off the map. Pelting the surface of a metal part subject to bending or twisting stress, round metallic shot hurled at high velocity cold-works the surface metal thereby lengthening fatigue-life.

Equipment for thus surface-treating metals uses various sizes of shot and exactly controls the velocity of impact.

Shot Peening is another of the great number of Victory Techniques which have been born or developed through war-time necessity. These new processes and manufacturing and assembly techniques can be tremendously important to you in peace-time

operation. You must learn what they are and adopt them if you are to compete in an industry suddenly moved 50 years ahead. Your Lindberg representative is eager to help you in any way he can and you should give him an opportunity to discuss with you the new developments in powder metallurgy, brazing, and treatment of metals by heat in any form.

LINDBERG ENGINEERING COMPANY
2452 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS


Lindberg
FURNACES

SUPER-CYCLONE for hardening, normalizing, annealing, tempering

CYCLONE for accurate, low-cost tempering and nitriding
HYDRIZING for scale-free and decarb-free hardening

• **R. J. Linney** and **W. J. Linney** formerly general superintendents, have been appointed district managers of the Port Henry District and the Chateaugay District, respectively, Republic Steel Corp., Cleveland.

• **Leroy F. Keely** has been appointed general sales manager of the Howell Electric Motors Co., Howell, Mich.

• **Oliver H. Castle** has been appointed manager of the Dallas district, American Machine & Metals, Inc.; **G. W. Johnson** has been appointed head of the Minneapolis district sales territory and **Harold N. Ewertz**, manager of the Philadelphia district.

• **Helmuth G. Braendel**, formerly chief development engineer, Continental Motors Corp., has been appointed chief engineer, Wilkening Mfg. Co., Philadelphia.

• **James D. Watson** has been elected treasurer of the Heinn-Werner Motor Parts Co., Waukesha, Wis., to succeed the late E. R. Estberg.

• **Capt. John J. Healy**, assigned to inactive duty after serving 33 months with the Army Air Forces, has returned to Copperweld Steel Co., Glassport, Pa., as its northwest representative.

• **Harry Harnischfeger** has been elected to the board of the Harnischfeger Corp., Milwaukee.

• **William A. Rock** has been named resident engineer in the Corpus Christi area for the Foxboro Co., Foxboro, Mass.

• **W. Miles Ryan**, formerly in charge of all food can sales of the Owens-Illinois Can Co., has been appointed assistant to **Clay B. Nichols**, packers' cans sales manager of the Central Division, Continental Can Co., New York.

• **T. J. Gallagher** has joined the Edw. S. Christiansen Co., Chicago, as sales manager.

• **Howard Halmes** has been named sales manager of Simmonds Aerocessories, Inc., New York.



EUGENE J. REARDON, vice-president and director, Superior Steel Corp.

• **Eugene J. Reardon** of the Superior Steel Corp., Pittsburgh, has been elected vice-president and director. Mr. Reardon will assume complete supervision of operations. He was formerly chief engineer of the American Steel & Wire Co.

• **Nathaniel G. Gill** has been appointed manager of the manufacturing division of the Bell Aircraft Corp. B-29 bomber plant at Marietta, Ga.

• **Donald H. Dalbeck** has joined the Reed-Prentice Corp., Worcester, Mass. as controller.

• **Walter H. Murphy**, formerly superintendent of the Valve Division, Parker Appliance Co., has been named shell production manager at the Victory Yard, Electric Boat Co., Groton, Conn.

• **Raymond P. Townsend** has been appointed vice-president and general sales manager, Transportation Department, Johns-Manville Sales Corp., New York.

• **C. H. Worrells**, for many years treasurer of the Anthony Co., Streator, Ill., has been appointed general sales manager of the firm. **Glenn A. Duis**, a consultant and director of the company for several years, has been elected executive vice-president.

• **Howard B. Hall** has been appointed New York, northern New Jersey and Connecticut representative of Designers For Industry, Inc., Cleveland. Mr. Hall's headquarters will be in New York.

• **P. J. Degnon**, vice-president of Mack Motor Truck Co., Long Island City, N. Y., has been appointed manager of the firm's New England Division.

• **Frédéric F. Brand**, for 12 years assistant to the general manager of the General Electric Co., Pittsfield, Mass., works, has been made works engineer.

• **W. R. Persons** has been appointed assistant sales manager of the Lincoln Electric Co., Cleveland.

• **Louis F. Sperry** has resigned as vice-president and treasurer of the Bell Aircraft Corp., Buffalo, N. Y.

• **J. A. Cronk** has been appointed manager of the Atlanta branch, Electric Storage Battery Co., Philadelphia, succeeding **Mark C. Pope, Jr.**

OBITUARY...

• **Walter W. Van Horn**, 69, president of the Shelby Metal Products Co. and vice-president of the Ohio Seamless Tube Co., Shelby, Ohio, died February 22.

• **Lester C. Klein**, assistant to vice-president, U. S. Steel Corp. of Delaware, died March 12.

• **T. W. Burns**, 57, former assistant general superintendent of the A. O. Smith Corp., Milwaukee, died March 6.

• **H. E. Mack**, 64, vice-president in charge of metallurgical engineering, LaSalle Steel Co., Chicago, died March 7. Mr. Mack had been with the firm since 1918, serving successively as superintendent, manager of Detroit sales office, sales manager and vice-president.

• **Harold C. McKay, Jr.**, chief metallurgist at the Fairfield, Conn., plant, Aluminum Co. of America, Pittsburgh, died March 4.

• **Raymond H. Filsinger**, purchasing agent for Crucible Steel Co. of America, New York, died suddenly March 5.



It is reported that

Helicopters capable of lifting as much as 15 tons and of carrying 35 or 40 persons, plus mail and baggage, are believed by one expert to be within the realm of possibility. *Col. H. F. Gregory, Engineering Division, Materiel Command, U.S.A.*

get ready with **CONE** for tomorrow

A pilot flying between South America and Africa recently flew across the Atlantic four times in three days. *Office of War Information.*

get ready with **CONE** for tomorrow

One of the country's leading department stores has scheduled a Postwar Fair for next May. Manufacturers are invited to participate, but space is not for sale. *R. H. Macy, New York City.*

get ready with **CONE** for tomorrow

Salvage apparatus for extremely great ocean depths has been patented. Its powerful jaws are guided by television apparatus. *Patent 2,355,086.*

get ready with **CONE** for tomorrow

Because of the high cost of converting ordinary electric power into high-frequency power, it is not at present believed that electronic cooking is practical for household use, although in commercial food processing it has great possibilities. Typical of its application to food processing is the recent experiment with packaged pancake flour in which the temperature inside the package was raised to 130 degrees in less than 30 seconds, completely destroying all insect life. *Scientific American.*

get ready with **CONE** for tomorrow

Rubber scientists think that they have solved the problem of ice on airplane propellers by the use of a three-ply rubber covering, the center layer of which is an electric heating element. *Goodyear Tire & Rubber Co.*

get ready with **CONE** for tomorrow

An inter-continental highway between Alaska and Siberia, by way of a tunnel under Bering Strait, is being seriously considered. *Alaska Highway Committee of Pacific Northwest Trade Association.*

Experiments are being made with plastic bottles blown in the same molds used for glass. *Advertising & Selling.*

get ready with **CONE** for tomorrow

A total of 29 dams is planned for the Pacific Northwest, the first six of which will cost 226 million dollars and provide power and water for a population of 2 million. *Engineering & Mining Journal.*

get ready with **CONE** for tomorrow

A new method of dyeing acetate rayon is said to make the colors practically fade-proof. *North Carolina Fabrics Corporation.*

get ready with **CONE** for tomorrow

A large airplane manufacturer has produced an experimental model of a 200 pound automobile. *Science Digest.*

The first commercial model of a sound-on-tape machine has been made and is said to play continuously for eight hours. *Fonda Corporation.*

get ready with **CONE** for tomorrow

The use of music in factories is expected to create jobs for 26,000 musically trained broadcast directors. *Science News Letter.*

get ready with **CONE** for tomorrow

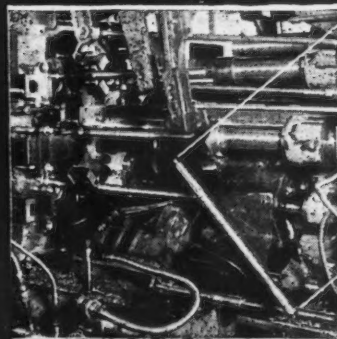
A new device that opens and closes a window thermostatically is waiting for release of materials to go into production. *E. O. Gillen, 1713 N. Water St., Milwaukee.*

get ready with **CONE** for tomorrow

A new eight-engined flying freight boat with 320 foot wing span is expected to be ready about the first of the year. *Howard Hughes, Aviation News.*

get ready with **CONE** for tomorrow

A new ingredient added to the Army's soap is said to make it work effectively in any sort of water, salt, fresh, cold, hot, soft, or hard. *E. I. duPont de Nemours & Co. Inc.*



Dear Editor:

ROLLED SHAPES

KINDLY AIRMAIL INFORMATION RE THE MANUFACTURE OF COLDROLLED SHAPES AND SECTIONS FROM STRIP STEEL AND GIVE NAMES OF MAKERS OF EQUIPMENT FOR SUCH PRODUCTS.

SIGURD WESTBERG
31 Moorgate, Rotherham, Yorkshire,
England

● Information on the way. Additional data obtainable from Yoder Co., Walworth Ave., Cleveland, Ohio, major manufacturer of such equipment.—Ed.

HARDENABILITY BANDS

Sir:

Dr. Davenport's article "Ferrous Metallurgy" in the Jan. 4 issue mentions the Tentative Hardenability Bands published by the AISI and the SAE. These bands provide valuable information on the range of hardness penetration possible within each analysis range. However, the bands are very wide and if we should have to accept steels such as NE 9445 or NE 8740 anywhere within these bands, it would be necessary to restrict parts made from them to relatively small diameters to assure adequate hardness penetration.

For most parts other property changes effected by alloying can vary within the limits possible for the specified analysis range without difficulty, but if the hardenability is deficient, a well quenched structure with its superior properties cannot be obtained. Consumers can probably tolerate a greater spread in chemical analysis but we need much narrower hardenability bands. Unless narrower bands are established we must waste quantities of alloying elements by ordering steel which will have adequate hardenability even at the bottom of the hardenability range, or expect many lots of steel to be unsuitable because they fall below the desired hardenability range.

The logical thing would be to change regulations so that heats of low hardenability could be used for small diameters and heats of high hardenability for large diameters. If the largest diameter rolled from any heat of steel would harden through with a moderate oil quench it should be adequate for the most critical applications. For many applications hardening to the center is unnecessary, but when surface hardness cannot be obtained the steel is unstable. Steel to be forged might likewise be designated for light, medium, or heavy forgings, depending on hardenability.

E. H. SNYDER,
Chief Metallurgist
Austin-Western Co.,
Aurora, Ill.

● In the particular steels mentioned, hardenability changes rapidly with relatively

small alloy changes. The Tentative Hardenability Bands of the AISI and SAE were devised to fall within practicable working limits of open hearth melting practice, and to attempt to narrow the bands at this stage of the development might result in difficulties in the plants of steel manufacturers. As experience is gained the situation might change in the general direction suggested, although it appears that we have not yet reached that point. At the moment, the best practice for consumers is to select the steel composition for a given job so that the minimum hardenability will be adequate for the purpose. A slight excess of hardenability in some cases is the premium paid to get the minimum necessary for any given application. This holds true whether the basis of selection is the hardenability band or chemical analysis. In general, this is not very wasteful of alloy and is something that must be faced until sufficient data are accumulated to justify narrowing the hardenability bands.—Ed.

GALVANIZING EQUIPMENT

Sir:

We are looking for manufacturers of hot dipped galvanizing equipment. Can you give us their names?

D. BERLIN

Dennis-Mitchell Industries,
4424 Paul St., Philadelphia 24

● A list of manufacturers is on the way.—Ed.

CATERPILLAR ERROR

Sir:

Your Feb. 1 News Front stated that "American Bridge Co. will likely make earthmoving equipment after the war, with Caterpillar Tractor Co. distributing the equipment. Caterpillar has dissolved its distributorship with LeTourneau. Possibly the American Car & Foundry Co. will assemble tractors for the Caterpillar-American Bridge combination." We have publicly announced our intention to market earthmoving equipment after the war, but it will be our own equipment. True, we have discussed a possible subcontract arrangement with American Bridge, although publicity on that score is premature as we have not reached final conclusions.

The statement that we have dissolved our distributorship with LeTourneau is misleading as we never had any kind of arrangement which could have been called a distributorship. The same distributors who sold Caterpillar tractors usually sold LeTourneau equipment, although almost all distributors also handled other manufacturers' scrapers and bulldozers. The LeTourneau Co. has announced that it would sell through other dealers, and thereafter we announced our intention to market our own line of earthmoving equipment, which in many instances would be competitive with the products of LeTourneau.

The last sentence respecting American Car & Foundry Co. has no found-

ation whatsoever. Moreover, it is misleading with respect to mention of a Caterpillar-American Bridge combination, which is totally non-existent and not even remotely contemplated.

W. J. MCBRIAN,
Vice-President and Treasurer
Caterpillar Tractor Co.,
Peoria 8, Ill.

● The wording of the item was much stronger than the facts warranted. We are very sorry and do hope the item has caused you no unpleasantness.—Ed.

PASSIVATING STAINLESS

Sir:

Would appreciate receiving some information relating to passivating stainless steel after finishing.

M. NOVELLA ADAMS,
Librarian

Sanborn Co.,
39 Osborne St., Cambridge 39, Mass.

● When stainless steels are worked with high speed or other steel tools, small particles may adhere to the surface through smearing action. Later these particles of steel rust, if not removed, so as to make it appear that the stainless steel is at fault. In order to avoid this it is necessary to passivate or immunize the parts by immersing them in a 10 or 20 per cent solution of nitric acid at 1140 deg. F. for about 20 min., or in a 40 to 50 per cent solution at room temperature for an hour. Whether or not stainless steel has been sufficiently passivated can be determined by immersing the part in a copper sulphate solution for about 2 min. Particles of steel other than stainless will be coated with bright red copper.—Ed.

NE8630 FOR X4130

Sir:

Our inability recently to secure open hearth X4130 alloy steel in small lots leads us to believe that it is no longer being produced in the open hearth. Can you verify this?

F. G. GRAY
Ellwood Safety Appliances Co.,
Ellwood City, Pa.

● Since April 1943, this composition has been prohibited from production for warehouse distribution and in its place national emergency steel NE-8630 is recommended. Even prior to that time 4130, which is primarily an aircraft quality steel, was produced in electric furnaces exclusively. Steels for this purpose must be magnifluxed to assure absence from segregation, pipes or non-metallic inclusions lest the vibrations to which they are subjected should cause them to fail.—Ed.

PRECISION THREAD ROLLING

Sir:

Enclosed is our check for \$1.25 for five more copies of "An Appraisal of Precision Thread Rolling Practice," from issues of Nov. 2, 9 and 16, 1944. We find that we have extensive use for this article and will need more copies than have previously been ordered.

V. PLESCHER,
Research Director
Library of Industrial Research,
415 North Dearborn St.,
Chicago 10

● Reprints mailed.—Ed.

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faster — at lower cost

Airless Wheelabrating produces finishes that are distinctive for their bright, clean, silvery appearance.

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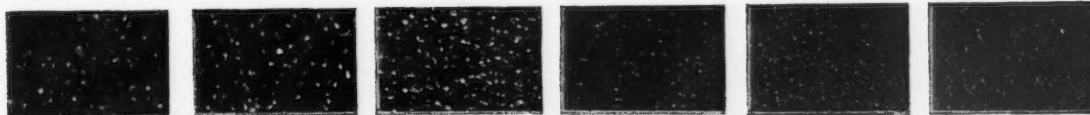
Light metal parts can be given a satin finish; and castings, forgings, heat treated parts and similar products can be blasted free of sand and heavy scale.

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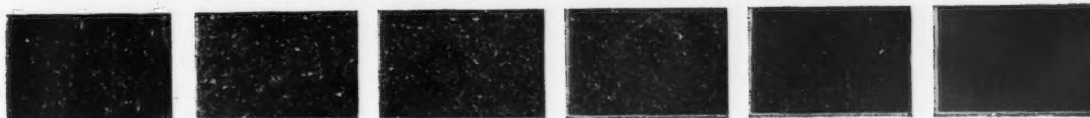
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MISHAWAKA, INDIANA

This Industrial Week

- In Some Cases March Orders Were Double Shipments
- Army and Navy Second Quarter Allotments to Be Cut
- Steel Ingot Rate Advances 2½ Points to 96.5 Per Cent

THE heavy influx of steel orders, apparent for some time, has not abated so far this month. Some steel producers find that new business in the first half of March was running almost twice the volume of shipments. The consequence has been a further increase in product carryovers.

Carryovers have expanded to such an extent that those involving galvanized sheets constitute almost a full month's production. To further complicate the steel distribution picture, cancellations this past week were at the lowest point in many months. Galvanized sheet deliveries are now being promised for February and March of 1946. Cold rolled sheets, which exhibit heavy carryovers, are not available before September of this year. Because of unplaced tonnage these deliveries may soon be extended further into the future.

An analysis of some mill books shows sheet capacity so overloaded that schedules calling for April production are as much as 145 per cent of theoretical maximum output. Additional sheet tonnage, much of it for landing mats, may raise the overload another 20 per cent unless corrective measures are taken in May and June. Sheet deliveries are now so far advanced that mills report a reluctance on the part of customers to place orders. WPB is reported to be cooperating in an effort to prevent bookings being placed too far into the future by withholding allotments for the fourth quarter of 1945 and the first quarter of 1946.

The Jefferson, Ind., quartermaster has entered the ranks of those unsuccessfully attempting to place drum sheet tonnages for second quarter production with an inquiry for 36,000 tons. The flat rolled situation was not bettered any this past week when a spasmodic slow down and work stoppage at Carnegie-Illinois Steel Corp.'s Gary sheet and tin mill resulted in a loss of flat rolled steel production estimated to be about 27,500 tons.

STRUCTURAL steel demand is exceptionally heavy and the volume of new business for this product is mounting. Currently structural steel carryovers in many cases are running almost as heavy as a half a month's output. U. S. Engineers office at Cincinnati is opening bids this week for 20,000 tons of structural steel to be used in building hangars, while the U. S. Engineers at Columbus are buying another 33,000 tons for the same purpose. The Chicago U. S. Engineers office is buying about 36,000 tons of structural steel for the construction of warehouses and storage buildings.

Reinforcing bar allocations for the second quarter are exceptionally low as WPB has cut back sharply on allotments for this type of steel. Although bar producers are permitted to use off heat steel for concrete bars, little of this is available because many customers prefer to take the "off grade" steel for their orders rather than wait a long time for a new heat to be made.

A summary of railroad car production slated for Russia, through the War Department, this year discloses the following items on which construction will start in July: Pullman Standard will build 3000 56-ton flats, while 2000 of the same type will be supplied by American Car & Foundry. Magor Car Co. will supply 500 40-ton dump cars. General American will build 400 40-ton tank cars and American Car & Foundry will deliver 265 tank cars.

Even though ODT requirements for domestic cars were reduced about 33 per cent in the second quarter, freight carbuilders have a substantial volume of work which will keep them busy for the rest of this year. The cut in railroad material requirements for the Foreign Economic Administration, while heavy, involved theoretical programs based on estimated needs with no contracts having been let.

During this past week it was apparent that future production of rails, alloy bars, reinforcing bars and possibly some structural steel, might be affected somewhat by an increase in April shell steel production. On the other hand, however, J. A. Krug, WPB head, told THE IRON AGE that Army and Navy requirements for the second quarter might be reduced as much as 200,000 tons. These returned allotments, Mr. Krug said, would be replaced by orders for railroad material, petroleum industry requirements, and steel for repairs. However, when and if these orders are scheduled, they will have to take their chance on the already tight and extended steel mill delivery setup.

The Rock Island Railroad order for 500 50-ton box cars with Pullman-Standard has not yet been approved or scheduled by WPB. Clinchfield Railway has placed 1000 50-ton hopper cars with American Car & Foundry. It is indicated that Pullman-Standard will furnish 250 to 1000 42-metric ton box cars for the Paulista Railway of Brazil. Uruguayan State Railway is inquiring for 6614 tons of rails and accessories. American Car & Foundry will furnish for the National Railways of Mexico 1500 50-ton box cars to be delivered this year.

National steel ingot operations rose two and a half points this week to 96.5 per cent of capacity. Pittsburgh output has increased one and a half points to 92.5 per cent while in Chicago the operating rate has gained one point to 102.5 per cent. Other districts showing increased production are: Youngstown, up one to 92 per cent; Wheeling, up five to 90 per cent; Detroit, up one to 100 per cent; the Western District, up half a point to 86.5 per cent; Cincinnati, up 31.5 to 91.5 per cent, and the Eastern District, up 14 points to 99 per cent. Declines this week have occurred in Cleveland, down one point to 97 per cent from last week's revised rate of 98 per cent, and Buffalo, down two points to 104.5 per cent from the previous week's corrected rate of 106.5. Philadelphia at 97 per cent; Birmingham at 99 per cent, and St. Louis at 94.5 per cent continue unchanged.

• **STEEL SLOWDOWN**—Because workers in the pickling department of Carnegie's Gary sheet and tin mill disapproved of an incentive plan which had been installed with WLB approval, slowdowns and work stoppages last week created a bottleneck which slowed and finally stopped the 42-in. hot strip mill, which feeds the tinning lines eventually, and the 80-in. hot strip mill, on which some plates now are being rolled. Management took a firm stand on the slow downs, suspending the 56 offenders out of 130 in the department. Shut down of the rolling mills threw 500 out of work, however, and up to Monday morning caused the loss of 27,500 tons of finished steel, the company estimates.

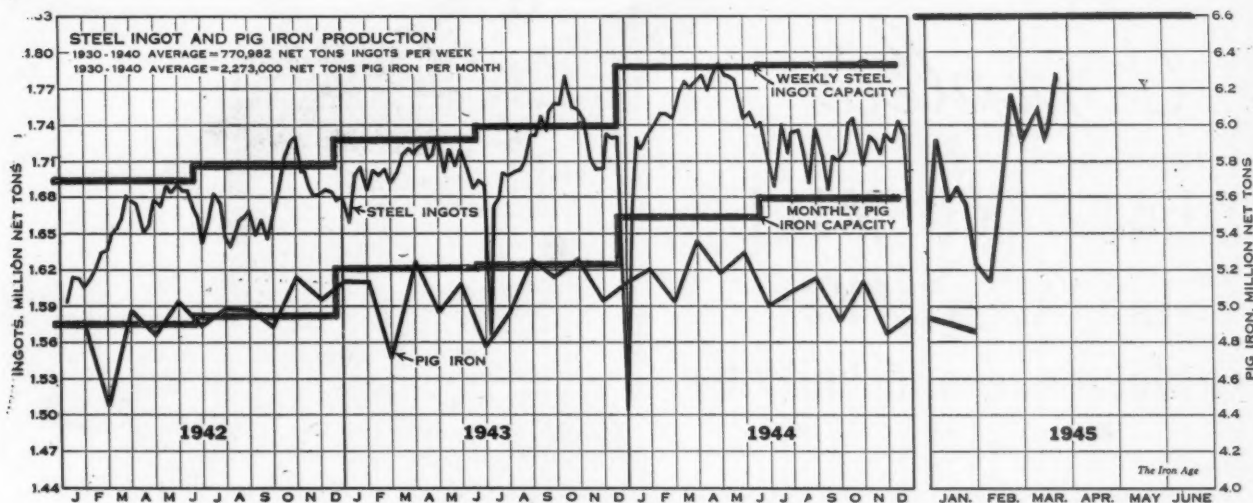
• **POSTWAR RAIL TRAVEL**—Although Electromotive Division of General Motors currently confines its activities to locomotive construction, G.M. industrial designers have prepared designs for postwar passenger coaches, sleepers, dining, and lounge cars. These designs have been made available to any railroad or carbuilder interested, it is understood, with the idea of opening radically new vistas in car design. Last Friday in Chicago Ralph Budd, president of Burlington, enthusiastically announced that his road would modify, as soon as restrictions permit, one of its lightweight cars in accordance with G.M. design. The floor of the middle section of the car will be lowered and a glass or transparent plastic dome built over this section, making it possible to have two seat levels, thus increasing the attractiveness of the ride and at the same time adding to the capacity of the car. It was pointed out that the full view roof would not be practical with coal or oil burning steam locomotives because of smoke. Charles F. Kettering, vice-president and director of G.M. presided at the meeting.

• **LONGER STEEL WORK WEEK**—Mr. Krug's letter to steel companies urging a longer work week in order to step up production may have little more effect than what is already being done in the industry. For months the industry has had its workers in strategic lines work as long as possible—some have worked 12 to 14 hr. a day for months on end. The lack of labor which keeps some of the open hearths idle in many cases is one of specific shortages. For instance common labor is needed to repair furnaces, but the supply of that type of labor is so limited that the time to make repairs has been lengthened considerably. There is little or no chance of getting more of

this type of worker; hence, those who are on those jobs are working longer hours. In certain skilled jobs on the furnaces, it is also a case of no more men of that type being available. Such workers are working long hours and have been for some time. The drive by Mr. Krug probably anticipates "warm weather" absenteeism.

• **STEEL PRICES**—Further steel price increases which had been expected by the trade at least by March 15 will probably not be announced by OPA until around April 1. One cause for the delay is said to be a change in the basic criterion used for making adjustments in steel prices. In adjusting certain steel prices upward on Jan. 11, the OPA made use of data based upon "out of pocket" losses on the steel products involved. There has been agitation following hearings before the Banking and Currency Committee for the use of manufacturing cost in arriving at losses sustained in producing certain steel items. At any rate some further adjustments on products other than those which were increased is expected soon and the new interim price announcement, when and if it comes, may also involve some or all of those items advanced on Jan. 11. According to rumors in the trade, Philip Murray, USWA head, will, if further steel prices are granted, lay down a barrage to obtain all or part of his 17c. an hr. demand which was turned down by the WLB. It is said without confirmation from him that plans are already underway to exert the necessary pressure for a reconsideration. Such a change in wages could probably only come from a decision on the part of the President.

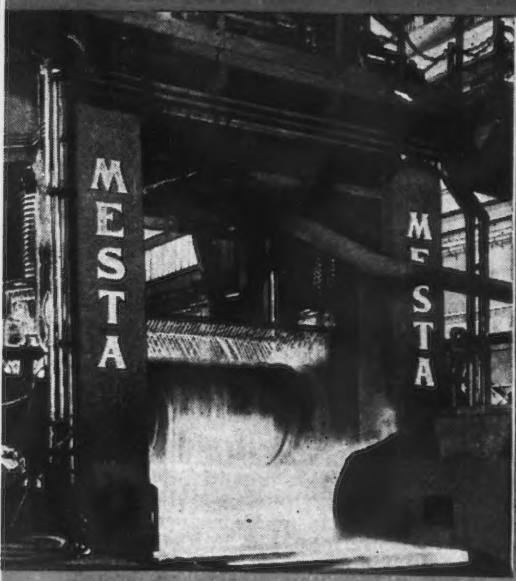
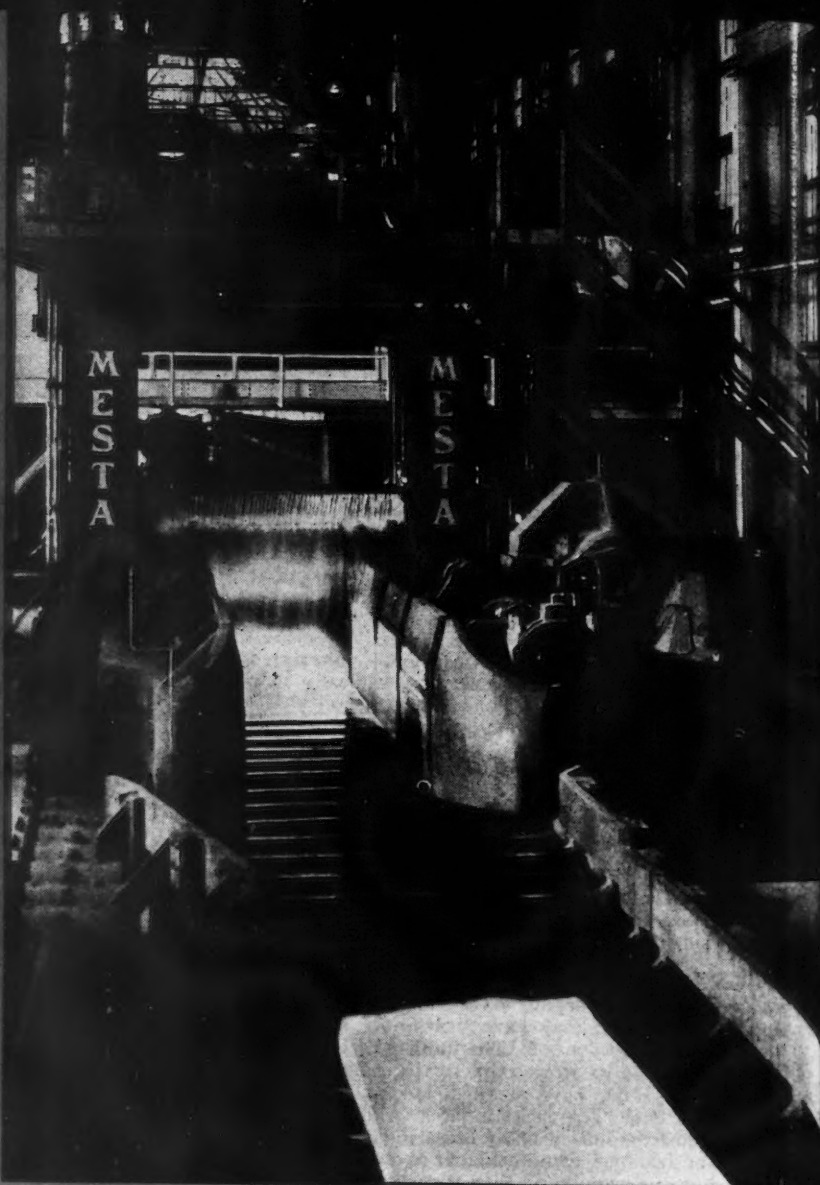
• **STEEL PAYROLLS**—Employment in the steel industry during January, 1945, was slightly above the December, 1944, level, according to the American Iron & Steel Institute. The average number of employees during January was 564,000 against 563,900 in December and 583,120 in January, 1944. Payrolls in January totaled \$150,266,500, including retroactive pay increases to hourly, piecework or tonnage employees and accrued liberalized vacation allowances, as authorized by the recent directive of the War Labor Board. In December payrolls totaled \$139,894,900. In January, 1944, the total of payrolls was \$141,794,000. Wage earners received an average of 123.3c. per hour in January, compared with 119.7c. per hour in December of last year and 116.5c. in January, 1944. Hours worked weekly averaged 47.7 in January, compared with 45.0 in December and 45.7 in January, 1944.



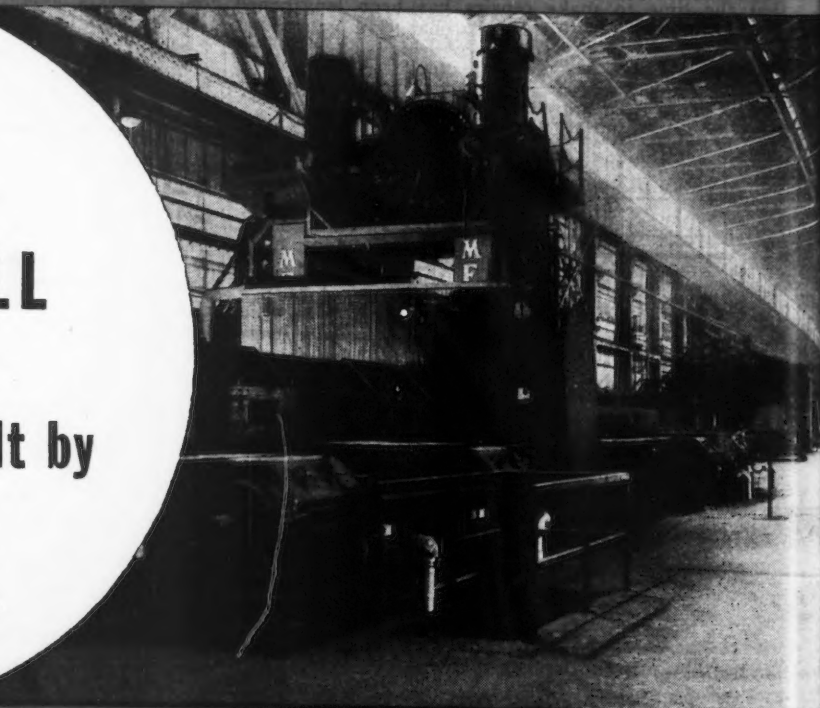
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	E. St.	Aggregate
March 13.....	91.0	101.5	91.0	97.0	98.0*	106.5*	85.0	99.0	99.0	88.0	60.0	94.5	85.0	94.0
March 20.....	92.5	102.5	92.0	97.0	97.0	104.5	90.0	99.0	100.0	86.5	91.5	94.5	99.0	96.5

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Tool Price Regulation Due For Revision with Other Equipment

Washington

• • • OPA will within the next week issue an amendment to General Maximum Price Regulation No. 136, machine tools and industrial equipment, affecting industrial equipment. At the same time, OPA will take regulation of industrial services out of GMPR 136 and formulate a separate regulation, GMPR 581, to govern the prices to be charged by job-shops performing more simple metal operations. GMPR 136 will be simplified and in some cases the amendment will provide for price adjustments.

The new GMPR 581 will cover all the following job shop operations: annealing, anodizing, bonderizing, blasting, carbonizing, carburizing, case-hardening, cleaning, coronizing, deoxidizing, electroplating, enameling, galvanizing, heat-treating, heat-resisting, jappanizing, lacquering, lead-coating, nitriding, normalizing, painting, pickeling, phosphate coating, polishing, sherardizing, shop-peening, tempering, and tinting.

The regulation does not apply to services performed on automotive, construction, road maintenance, or farm equipment, as such services are covered by GMPR 165, nor of installed building materials because such services are covered by GMPR, nor to secret contracts, nor to contracts for lend-lease account, nor developmental contracts.

Shop operators may charge the rates in effect on March 31, 1942, or the highest price charged between Jan. 1, 1942, and March 31, 1942, or use the same method of computing prices that was in effect on March 31, whichever method applies to the individual shop best.

On charges for work of a new nature, prices may be determined by the method of computation in effect on March 31 and prices charged for the trial run must be included in the entire contract. Records, including invoices detailing charges under one of the approved methods, must be maintained so long as the price law is in effect.

When none of the foregoing methods can be used by a shop in figuring prices and annual income exceeded \$75,000 a year, or the company was not in business on March 31, the shop owner should apply to the OPA Machinery and Equipment

Branch in writing requesting approval of a schedule of rates. Cost information submitted should include labor rates in effect in the area during the base period and rates should be in line with rates charged for similar services in the area served.

U. S. Steel's Sales Increase in 1944, But Net Income Declines

New York

• • • If the interim price increases granted by OPA on Jan. 11 on five steel products, together with an increase granted on Feb. 14 on pig iron, had been in effect during 1944, the sales revenue of U. S. Steel Corp. for that year would have been increased about \$17,000,000, according to the company's formal report. This figure would seem to indicate U. S. Steel's share of the steel price increase which was granted by OPA because of "out of pocket" losses in 1945, if business remains about the same. Any subsequent price increases which are now under deliberation by OPA will, if granted, add further to the corporation's sales revenue for 1945.

The value of products and services sold by U. S. Steel Corp. and subsidiaries in 1944 amounted to \$2,082,186,895, compared with \$1,972,344,751 in 1943, or an increase of 5.6 per cent.

Net income in 1944 amounted to \$60,791,281; compared with \$62,631,742, or a decrease of 2.9 per cent. After dividends in 1944, the company carried forward for future needs \$758,596, compared with \$2,599,057 carried forward in 1943, or a decrease of 70.8 per cent.

U. S. Steel's average number of employees during 1944 was 314,888, a decrease of 25,610 from the all-time high of 340,498 in 1943. The average weekly pay of U. S. Steel's wage earners in 1944 reached a new high of \$54.37, including the retroactive wage increase. Average number of hours worked per week was 44.1. After eliminating the effect of employee turnover, the average pay of wage earners in the steel producing subsidiaries, including the retroactive wage increase, was \$57.38 for an average work week of 45.9 hr. Union checkoff of dues, fees, fines, etc., in 1944 which the company turned over to union officials amounted to \$2,900,000.

In 1944 U. S. Steel employed approximately 40,000 women. At the end of last year almost 25,000 women were engaged directly in production work, ranging from labor to technical occupations.

As of Dec. 31, 1944, U. S. had added to its payroll about 14,000 veterans of the present war, including 7000 who have returned to the subsidiary companies for which they formerly worked. More than 112,000 U. S. Steel employees have entered the armed services since the national emergency began.

TANK ROCKETS: U. S. General Sherman Tanks, equipped with rocket launchers, are being widely used in Germany. After the rockets have been fired the racks overhead are jettisoned.



Ore Shippers Getting Ready for Lake Trade

Cleveland

• • • Abetted by an early spring sun, ice is breaking up around the Great Lakes as fit-out crews boarded ships wintering in lower lake ports this week. Engineers are already aboard tuning up machinery for the eight months of strenuous duty ahead.

Generally, the ships will start for the northern ore and grain ports around April 1, and the United States Coast Guard has assured the Lake Carriers Association that the new \$10,000,000 ice breaker *Mackinaw* will start a few days earlier on the task of churning through the ice that remains in the Straits of Mackinac, the St. Marys River, and Whitefish Bay.

Present indications are that the lake freighter fleet will be called upon to move 83,000,000 gross tons of iron ore (3,000,000 more than the amount carried in 1943), 340,000,000 bushels of grain for American ships, 60,000,000 net tons of coal and more than 15,000,000 tons of limestone.

For more than a week now, two tankers have been moving petroleum products in Lake Michigan, which is free from ice, and the motor vessel *Messenger*, of the Neuman Boat Line, was scheduled to start her regular island trips before the week-end. Last year, the *Messenger* did not start regular runs until March 24.

Cleveland harbor and Lake Erie outside have been without ice for days, but reports indicate that there is plenty of it at both ends of the lake and in the Straits of Mackinac and the St. Marys River. Buffalo has reported that ice fields outside in Lake Erie were breaking up rapidly, with open water visible for several miles.

According to an announcement by the Coast Guard, two of its Grumman J.R.F. planes from Miami, Fla., and Elizabeth City, N. C., have been assigned to the Great Lakes to make ice survey in connection with the opening of navigation.

Self-unloaders, lake-designed ships which unload their own cargoes of coal and limestone, began fitting out days ago. These vessels carry materials in the short-haul trades of the lower lakes and their season will start some time ahead of the conventional bulk freighters.

It has been reported that many of the ships now fitting out will find it necessary to start their initial runs without usual cargoes of coal because

the customary pre-season shipment from the mines cannot be made this spring due to the cold weather and fuel shortages in certain localities.

Because of an expected record season movement of coal, iron ore, grain, and limestone this year, the lake coal transshippers had asked for sufficient March shipments of coal to the docks for early loading so that the ships would be ready to move with their cargoes for the Upper Lakes behind the ice-breakers.

OPA Boosts Prices On Yokes and Sideframes

Washington

• • • Declaring that the present ceilings are "too low to be generally fair and equitable," OPA has announced increases effective March 22 of 3 per cent in prices for rigid and swivel yokes and of 8 per cent for sideframes in the railroad steel castings specialties field. The increases, OPA said, are price adjustments made on the "product standard" basis and are designed to permit railroad specialties producers to cover "out of pocket" costs on the items. The increases were made under the Emergency Price Control Act and were based on a study made at the request of the Railroad Specialties Advisory Committee.

OPA said that the study also showed that ceiling prices on bolsters and couplers did not need to be increased.

Farm Equipment Castings To Get Some AA-1 Ratings

Washington

• • • With production of farm equipment (exclusive of repair parts) about 20 per cent behind schedule, WPB has announced that a limited volume of malleable iron castings needed in essential farm equipment will be up-rated to AA-1. This action was designed to improve this year's schedules, but is considered by the trade too late to be of much value. Current production is about 20 per cent behind schedule.

The announcement said that manufacturers who are behind schedule because of inability to obtain malleable iron castings should apply immediately to the Farm Machinery and Equipment Division for AA-1 assistance. Up-ratings will be assigned only on castings to be delivered before July 1.

Railroad Carbuilders To Be Busy in 1945 In Spite of Cutbacks

Pittsburgh

• • • Railroad carbuilders that have anticipated any increase in domestic car construction during the remainder of the year have had such hopes dashed by recent WPB orders. Office of Defense Transportation allotments of steel for the second quarter alone have been cut about 105,000 tons, or about 33 per cent of estimated requirements.

However, carbuilders are booked pretty solidly throughout the remainder of the year on other than domestic carbuilding and on war business. It is estimated that the passenger carbuilding program has been cut to 15 cars for 1945, all of which were pretty well under construction by American Car & Foundry when the railroad cutback came. These cars are believed to be baggage type cars.

Carbuilding for export, despite domestic cutbacks, is flourishing. Pullman Standard at Bessemer, Ala., is building 3000 56-ton flats; American Car & Foundry at Huntington, W. Va., is building 2000 56-ton flats; Magor Car Co., at Passaic, N. J., is building 500 40-ton dumps; General American at Sharon, 400 40-ton tanks; and ACF at Milton, Pa., is building 265 40-ton tank cars for the U. S. War Department. All of these cars will be shipped to Russia.

While Foreign Economic Administration's carbuilding program was cut about 45 per cent, this cut is not expected to be as severe or as serious as the ODT cut, mainly because FEA's estimates of requirements were based originally on a planned program, and the cutbacks were on this basis. ODT, on the other hand, suffered its cutback on building programs that were scheduled rather than on setup allotments that were not issued to the builders.

While the rail production program has been cut back quite substantially, with one Chicago rail mill reporting that 7000 tons were cut for the second quarter to make room for the production of additional shell steel, producers express the opinion that the Class I railroads will not suffer too much on this account. It is believed that their roadbeds have been maintained rather well and there still might be substantial quantities of rail that has not yet been laid, due to inclement weather during the past three months.

Aluminum Co. of America Sees Big Future for Light Metal Fabricators

Washington

• • • Testimony before the Senate Small Business Committee reached its climax with the testimony of I. W. Wilson, vice-president in charge of operations of the Aluminum Co. of America. He presented a prepared statement representing the opinions of that company stating that Congress should formulate the overall policy as regards the postwar operation of light metal plants, and asserted that Alcoa would follow Congress' mandate wherever the company's help is needed.

The possibilities for small fabricators of aluminum were given particular attention by Mr. Wilson, who stated that in areas such as the Pa-

cific northwest, where power is ample for aluminum smelting, small fabricators today have only aircraft parts experience.

Careful emphasis was laid on the importance of an integrated organization to perform the basic operations in the production of aluminum, presumably of the nature that Alcoa now is. According to the statement:

"... any American aluminum company will find it difficult to compete successfully in the world's aluminum markets of today unless it has the benefits of the economies resulting from a large scale integrated operation beginning with the mining of the ore, its transportation to the alumina plant, the operation of the alumina

plants, and the smelting and semi-fabrication of the metal. This is because the American companies must compete with European and other aluminum manufacturers who are either integrated in this manner or who have achieved similar results through agreements between several manufacturers."

The Alcoa testimony described in some detail its activities in the expansion of the aluminum market, in research, and fabricator's assistance, as well as the factors which make the future market for aluminum expandable.

Congress was requested in the statement not to lay down a hard and fast rule for plant disposition until the peace treaty has been signed, and the potential future military needs for the light metal can be better ascertained.

• • •

Krug Asks Longer Steel Work Week

Washington

• • • In hopes of adding 36 open hearth furnaces, said to be idle, as reported by the WPB Steel Industry Advisory Committee early in March, WPB Chairman J. A. Krug sent a letter on March 13 to all steel producers urging that they make arrangements with employees to work the maximum number of hours each week which can be mutually agreed upon.

Mr. Krug said that he had discussed the problem with the president and other officers of the USWA and they assured him that the union would lend every support to lengthen the work week to the extent it can be done without injury to the men.

The Steel Division discussed the subject with the majority of the industry executives who are members of the Advisory Committee. These men, who represent companies having 72.2 per cent of the combined total employment in the industry, emphasized the fact that they are and have been, so far as their own companies are concerned, committed to the policy of providing overtime work for all qualified employees who are willing to work additional hours or days on available jobs, at the established rates of pay for the work involved, wherever such overtime can contribute to increased production of essential items.

The capacity of the furnaces said

to be off because of a manpower shortage is 164,000 ingot tons a month and by lengthening the work week, WPB hopes that this capacity can be meshed with finishing capacity to increase finished steel output in needed products. Mr. Krug pointed out that the Advisory Committee in its manpower report recommended "that the industry continue to work all men all available overtime where their services will contribute to essential production." He said it is imperative to use all workers now em-

ployed on as long a work week as it is possible to persuade them to undertake. A similar letter is being sent to all USWA affiliates by the union at the request of Mr. Krug.

Ore Price Relief From OPA Foreseen

Cleveland

• • • Because OPA has cost studies underway to determine the effects of possible wage increases of iron ore miners on ore prices, OPA said on March 17 that it would not be necessary for Lake Superior ore producers to file individual requests for price relief as the result of wage increases. OPA implies that it will make necessary adjustments to take care of wage increases. This action, effective March 29, excepts all producers (who would otherwise have to file requests for relief under OPA procedure) affected by the case designated by WLB as "In re: Butler Brothers, et al, and the United Steel Workers of America."

Renegotiation School Planned

Chicago

• • • Renegotiation of 1944 profits will be discussed by Col. Maurice Hirsch, chairman of the War Contracts Price Adjustment Board and the War Department Price Adjustment Board, at a War Problems School session of the Chicago Association of Commerce at 12.15 p. m. Friday, March 23, in the Palmer House.

Steel Needs May Drop

Washington

• • • Steel requirements for the Army and Navy may be decreased by 200,000 tons in the second quarter, WPB Chairman Krug told THE IRON AGE on March 20.

Mr. Krug said that while the reduction figure had not been finally set, the screening was the "usual thing." He praised the services for their real cooperation and said that if the steel industry operating rate permits, the returned steel allotments will be devoted to such important things as the railroads, petroleum production and repairs of all types. He pointed out that "B" products had received a sharp cut in the requirements committee, but that details of the redistribution of the returned allotments have not been worked out.

Foundries Protest Further Drafts in Face of Expanded Schedules

Cleveland

• • • Vigorous protests against further withdrawals of skilled and semi-skilled workers from the gray iron foundry industry this week were in the hands of high Selective Service and War Manpower Commission officials.

W. W. Rose, executive vice-president of the Gray Iron Founders Society, with headquarters here, charged that draft boards are calling "irreplaceable workers" from an industry that is "basic and highly critical."

At the same time, A. F. Hinrichs, acting commissioner of the Bureau of Labor Statistics, here to open a regional bureau office, announced that nearly 500,000 additional workers are needed to carry out the nation's large scale munitions program in the next six months.

Mr. Hinrichs said his estimate is based on an expanded program in ordnance and communications, total requirement of which will be 700,000 workers, but more than 200,000 of these, he said, will be gotten from other war industries showing a decline in the six-month period.

Cleveland industrialists were also subjected to criticism this week when Richard E. Reisinger, president of the Cleveland Industrial Union Council, charged that they are failing to plan now for postwar jobs and called upon the unions to work with industry in mapping Cleveland's share of the 60,000,000 national jobs program.

"Cleveland's proportionate share in that postwar plan will be 600,000 jobs, 150,000 more than we had employed here in 1940," Mr. Reisinger told the bi-weekly meeting of the CIUC this week. Loss of two new airlines in Cleveland recently is an example of the manner in which Cleveland business leaders are "missing the boat," the union leader asserted.

But in Columbus, it was announced this week that for the second consecutive month, the gas shortage was a definite factor in increased claims for unemployment compensation in Ohio during February. Nearly one-third of the 3555 new claims received, representing an eight per cent gain over January, were the result of this cause. It also marked for the first time that new claims received in February outnumbered the January claims.

Benefit payments during the month

showed an 11 per cent decrease under January, and payments for the month totaled \$79,477, representing compensation for 5660 weeks of unemployment.

It was also learned that a new order, requiring that all information about decisions and operations of Ohio's workmen's compensation system be submitted to a censor, has

been placed in effect by the Ohio Industrial Commission. The order prohibits any employee of the Commission from giving out any information without first submitting it to a censor.

Commission members were quick to explain that the order was not intended to prevent newspapers from obtaining information, but was designed to prevent misinformation from getting public and to plug leaks of confidential information that might get into the hands of unscrupulous persons.

H-20 Portable Bridge Use Again Revived

Washington

• • • A bridge which was in danger of becoming obsolete two years ago is today one of the most critical engineer items in the whole Army supply program.

Designed originally as a tactical assault bridge, in which role it was practically superseded by the Bailey, the "Portable Steel Highway Bridge, H-20," has now come back to life as a truss member of the fixed bridges, which Army Engineers are putting in all over the world.

The H-20 bridge section is a box truss prefabricated of high-strength steel, 12½ ft. long, 2 ft. wide, and 6 ft. in width. Each section weighs 1730 lb. The sections are connected end to end with 25-in. bolts. Normal spans up to 125 ft. in length can thus

be put together from the sections quickly and with the simplest mechanical equipment.

For its original use as a tactical assault bridge, the H-20 was provided with erection jacks and rollers similar to the Bailey bridge launching equipment. Because of the weight of the individual sections, a truck-mounted crane was normally used to unload them from the cargo trucks and spot them in convenient places for assembly. Heavy-duty winches on either trucks or tractors, plus a gin pole on the far bank, are the only mechanical aids necessary for the erection, and normal erection time for a 125-ft. bridge is three hours for an experienced engineer platoon under favorable conditions. The bridge may be launched in one clear span out over a ravine or narrow stream in cantilever fashion, the bridge being pushed forward as new sections are bolted in place at the rear.

REVIVED BRIDGE: Although in danger of becoming obsolete two years ago, the Engineer's Corps is once more using the H-20 span of prefabricated box truss steel. Originally an assault bridge, it is now being used to repair bridges in rear areas.



Steel and Iron Conservation Order Issued as WPB Amendment to M-126

Washington

• • • Because, since it was issued on May 5, 1942, other orders and regulations adequately control the use of iron and steel in a number of products, WPB on March 13 announced an amendment to M-126 which eliminates reference to 86 products which had been included in the order. The order was designed to provide an overall iron and steel conservation measure.

The order as amended says that iron and steel for maintenance, repair and operating supplies for products prohibited under the order may be used only to replace parts of a product if the parts are to be used for maintenance and repair of such a product. The manufacture of a complete product that has been prohibited under the order is not permitted through the use of MRO. Another change provides

that iron and steel for water tanks and water tank towers authorized by the appropriate WPB Subdivisions on form GA-1456 or form WPB-2274, may now be obtained without an appeal under M-126.

The appeals clause has also been modified to correspond with the provisions of Priorities Regulation No. 25.

Other important revisions include:

1. Sixteen items changed to conform to other orders.

2. Three items changed to delete references to orders that have been revoked.

3. Eight items changed to delete reference to the steel recovery corp., which is no longer in existence. Under this revision, the products mentioned are now permitted to use steel from idle and excess inventories in accordance with existing regulations.

Chinese WPB Expects Greater Steel Output

New York

• • • According to reliable information, Donald Nelson's Steel and WPB Brain Trust, which went to China some months ago to establish a Chinese WPB has been successful far beyond original expectations.

It is understood that the Chinese WPB has been organized and is functioning in excellent shape in the short

space of two and a half months. Steel mills, which in China Proper are considerably smaller units than in this country, are already stepping up production, not only in quantity but in quality as well.

Recent figures on steel output for China Proper indicate no more than an annual output of 13,000 to 15,000 tons. A greater tonnage is expected to be produced in 1945. By 1946 small Chinese steel units, because of American help, may produce as much as 35,000 tons for that year. It is under-

stood that even this figure may be exceeded.

Because Americans talk in steel tonnage terms of close to 100,000,000 tons, the significance of the improvement in Chinese steel output might be overlooked. When Japan invaded Manchuria and some other parts of China, by far the greater part of the Chinese steel industry came under their control, leaving China Proper with a mere fraction of the country's once total steel capacity. Plans are already drawn up for a substantial expansion in China which will probably be completed as soon as the Japanese are defeated.

Open Hearth Group To Hold Section Meetings

New York

• • • Subsequent to the cancellation of the 28th National Open Hearth Conference and in compliance with the request of a number of open-hearth producers, the executive committee of the National Open Hearth Conference has authorized its local sections to sponsor and hold, if desired, local conferences on open-hearth steel during the Spring of 1945, provided these are held in accord with the regulations of the Office of Defense Transportation.

Local conferences so far scheduled are as follows: Philadelphia, April 20; Chicago, April 27; St. Louis, May 4; Pittsburgh, May 18.

At these conferences the technical program originally lined up for the National Conference will be covered as completely as practicable and the transcript of the discussion at the local meetings together with a number of especially prepared papers and written discussions, will be published as the 1945 proceedings of the group.

There are no restrictions on attendance at such meetings by those "using only city or suburban transit facilities—or in the case of rural communities, transit facilities within the normal trading area—and for which no hotel sleeping accommodations are necessary;" for all others there are definite restrictions to which local sections and the hotels concerned will adhere rigidly.

Wickwire Reports on Earnings

New York

• • • Wickwire Spencer Steel Co. reports net earnings for 1944 of \$1,536,991 or \$3.18 per share. Comparative net earnings in 1943 were \$1,516,613 or \$3.30 per share.

90 MM. HOLE: This tiger tank on the European front is reported to have been knocked out by the firepower of the 90 mm. gun on an American M-36 tank destroyer.



Hearings to Discuss Future World Markets For Small Business

Washington

••• Hearings will begin on April 17 before the Foreign Trade Subcommittee of the Senate Small Business Committee to investigate the importance of export markets as a contributor to the national income and the role that must be played by American small business in order to achieve the desirable foreign trade goals. In announcing the hearings, Senator Claude Pepper, Democrat of Florida, chairman of the subcommittee, said that world markets must be found for small business if business prosperity based on full production and full employment is to be realized in the postwar period. Obstacles to the full participation of small business will be examined, he said, and

measures formulated for overcoming them. He emphasized the subcommittee's desire to learn the thinking of government agencies and businessmen regarding the potentialities of postwar foreign trade and desirable means to attain maximum expansion in this important segment of business.

Secretary of State Edward R. Stettinius, Jr., Secretary of the Treasury Henry Morgenthau, Secretary of Commerce Henry Wallace and Foreign Economic Administrator Leo. T. Crowley have been invited to testify at the open hearings. Representatives of industry, agriculture, labor and civic organizations also will be asked to testify.

Senator Pepper said that the subcommittee desires to obtain the fullest information from government officials directly concerned as to the effect on the business community, particularly the small business man, of the agreements reached at Mexico

City and the foreign trade provisions of the master lend-lease agreement. The subcommittee, he said, is equally interested in learning the plans of the Commerce Department for securing full employment and for opening up additional opportunities for the small business enterpriser through sound expansion of export-import trade.

Subsequent hearings, the Senator added, will explore in detail the various foreign trade problems which will confront America with the coming of peace. Prominent among these subjects are existing aids to foreign trade available through government services, tariffs and customs regulations, both at home and abroad; ocean freight rates; mechanisms for achieving exchange stability; export credit insurance; trading companies created by foreign governments; financing facilities available to small exporters and importers; and the implications of industrialization of foreign countries.

A13-10

AMERICAN IRON AND STEEL INSTITUTE CAPACITY, PRODUCTION AND SHIPMENTS											
Period JANUARY - 1945											
Steel Products	Number of companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month				To Date This Year			
				Production		Shipments (Net Tons)		Production		Shipments (Net Tons)	
				Net Tons	Per cent of capacity	Total	To members of the industry for conversion into further finished products	Net Tons	Per cent of capacity	Total	To members of the industry for conversion into further finished products
Ingot, blooms, billets, tube rounds, sheet and tin bars, etc.	45	1	xxxx	xxxx	xxx	705,018	186,589	xxxx	xxx		
Structural shapes (heavy)	12	2		257,698		258,786	xxxx				xxxx
Steel piling	3	3	9,580,550	21,324	34.3	19,800	xxxx				xxxx
Plates (sheared and universal)	27	4	17,841,320	807,816	53.3	787,846	44,811				
Strip	5	5	xxxx	xxxx	xxx	57,521	48,068	xxxx	xxx		
Rails—Standard (over 60 lbs.)	4	6	3,669,000	193,189	62.0	184,324	xxxx				xxxx
—All other	5	7	512,000	14,661	33.7	14,575	xxxx				xxxx
Splice bars and tie plates	12	8	1,745,960	64,637	43.6	65,607	xxxx				xxxx
Track spikes	10	9	349,400	13,356	45.0	13,774	xxxx				xxxx
Hot Rolled Bars—Carbon	35	10	xxxx	721,552	xxx	544,540	93,125		xxx		xxxx
—Reinforcing—New billet	13	11	xxxx	57,451	xxx	52,807	xxxx		xxx		xxxx
—Rerolled	13	12	xxxx	5,304	xxx	4,347	xxxx		xxx		xxxx
—Alloy	24	13	xxxx	271,756	xxx	200,376	25,465		xxx		xxxx
—TOTAL	45	14	22,149,300	1,066,153	56.1	802,070	118,590				
Cold Finished Bars—Carbon	21	15	xxxx	150,734	xxx	146,519	xxxx		xxx		xxxx
—Alloy	24	16	xxxx	37,558	xxx	32,876	xxxx		xxx		xxxx
—TOTAL	21	17	2,963,110	188,292	74.8	179,395	xxxx				xxxx
Tool steel bars	17	18	261,560	11,164	50.2	11,484	xxxx				xxxx
Pipe and Tubes—Butt weld	16	19	2,162,520	113,141	61.6	110,411	xxxx				xxxx
—Lap weld	8	20	830,200	45,300	64.2	43,667	xxxx				xxxx
—Electric weld	11	21	1,380,900	79,262	67.6	76,435	xxxx				xxxx
—Seamless	15	22	2,756,100	204,050	87.1	206,749	xxxx				xxxx
—Conduit	7	23	187,000	7,389	46.5	7,445	xxxx				xxxx
—Mechanical tubing	12	24	1,117,600	71,501	75.3	60,902	xxxx				xxxx
Wire rods	27	25	7,311,470	398,489	64.2	105,079	35,824				xxxx
Wire—Drawn	41	26	5,674,140	324,622	67.3	184,368	9,908				xxxx
—Nails and staples	19	27	1,253,360	52,343	49.2	48,892	xxxx				xxxx
—Barbed and twisted	15	28	539,610	21,846	47.7	19,586	xxxx				xxxx
—Woven wire fence	16	29	1,115,860	35,035	37.0	32,156	xxxx				xxxx
—Bale ties	12	30	149,780	5,982	47.0	5,730	xxxx				xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	36,178	xxxx	xxxx	xxx		xxxx
—Chemically treated	8	32	465,000	9,427	25.9	7,053	xxxx				xxxx
Tin and Terne Plate—Hot dipped	9	33	3,758,850	177,143	55.5	179,433	xxxx				xxxx
—Electrolytic	10	34	2,231,850	71,206	37.6	57,339	xxxx				xxxx
Sheets—Hot rolled	30	35	19,197,320	1,136,554	69.7	539,675	31,262				xxxx
—Cold rolled	12	36	7,131,460	391,401	58.0	196,039	xxxx				xxxx
—Galvanized	16	37	2,915,130	152,202	61.5	138,850	xxxx				xxxx
Strip—Hot rolled	24	38	7,055,390	220,874	36.8	138,221	20,635				xxxx
—Cold rolled	35	39	3,119,850	121,158	45.7	109,309	xxxx				xxxx
Wheels (car, rolled steel)	5	40	319,400	23,659	87.2	23,450	xxxx				xxxx
Asles	6	41	408,170	11,088	32.0	9,692	xxxx				xxxx
All other	4	42	176,290	3,224	21.5	2,848	xxxx				xxxx
TOTAL STEEL PRODUCTS	152	43	xxxx	xxxx	xxx	5,435,647	495,487	xxxx	xxx		xxxx
Effective steel finishing capacity	152	44	67,310,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	152	45	xxxx	xxxx	xxx	86.4%	xxxx	xxxx	xxx	xxxx	xxxx

During 1943 the companies included above represented 98.9% of the total output of finished rolled steel products as reported to American Iron and Steel Institute..

Why use Rustless Stainless Steel?

Modern materials give designers great freedom of choice. Stainless Steels by Rustless closely approach the designing engineer's ideal. They offer combinations of properties, high strength-weight ratio, a wide variety of physical characteristics, ease of fabrication and great permanence in service.

A few of the advantages of using Stainless Steels are...



DURABILITY

Stainless Steels have remarkable resistance to a wide variety of corrosion conditions and to the effects of high temperature exposure; no plating to peel or wear off; no paint to chip; possess great dimensional stability and resistance to abrasion and erosion.

STRENGTH

Over a wide temperature range Stainless Steels, depending upon grade and size, offer: tensile strengths ranging from 70,000 to 300,000 pounds per square inch; high yield strengths; high strength-weight ratios, thus permitting lighter, safer, and more dependable structures.

STIFFNESS

With high elastic moduli, Stainless Steels have nearly twice the rigidity of copper base alloys—three times that of aluminum—five times that of magnesium—and many times that of plastics. This is important when designing for minimum space.

TOUGHNESS

Stainless Steels will absorb great shock loads even at extremely low temperatures and have exceptional endurance strength; yet they can be machined, formed and welded with ease.

ECONOMY

In spite of somewhat higher initial cost compared to ordinary steel, Stainless Steel products have long life at low maintenance which results in best overall economy. Fabrication costs which often constitute the bulk of total costs can be reduced by the application of proper techniques.

SALES APPEAL

The clean, bright surface of Stainless Steels has captivated public acceptance for appearance, sanitation and utility. Consumer articles marked "Stainless" sell quickly.

HOW TO SELECT THE PROPER STAINLESS GRADE

There are many grades of Stainless Steels. Each has its own composition, physical characteristics, mechanical properties and degree of corrosion resistance and workability.

Because the characteristics of Stainless Steels differ from one another and from other materials, you will want to consult Rustless—America's only exclusive producer

of Stainless Steels—for data and experience necessary for proper design and selection.

All Stainless Steels contain as a basic ingredient ten percent or more chromium. It is this element which produces the corrosion and scale resisting properties. Such elements as nickel, molybdenum, columbium, titanium and several others contribute special attributes.

THERE ARE THREE BASIC GROUPS OF STAINLESS STEELS

Straight Chromium—Hardenable by Heat Treatment

Rustless 12	Type 410
Rustless 12T	Type 403
Rustless 12FM	Type 416
Rustless 13-C-35	Type 420
Rustless 13-C-35FM	Type 420F
Rustless 16-2	Type 431
Rustless 17-C-60	Type 440A
Rustless 17-C-80	Type 440B
Rustless 17-C-100	Type 400C
Rustless 17-C-100FM	Type 440FM

A wide range of physical properties may be obtained by quenching from hardening heat. The high carbon grades are generally used in the hardened and stress-relieved condition.

Straight Chromium—Non-Hardenable

Rustless 17	Type 430
Rustless 17FM	Type 430F
Rustless 21	Type 442
Rustless 27	Type 446

Superior in corrosion resistance to above group. Generally used in annealed or soft condition.

Chromium—Nickel—Hardenable by Cold Work Only

Rustless 18-8	Type 302
Rustless 18-8	Type 304
Rustless 18-8FM	Type 303
Rustless 25-12	Type 309
Rustless 18-12-3Mo	Type 316
Rustless 18-10-Ti	Type 321
Rustless 18-10-Cb	Type 347

Highest corrosion resistance of all. Non-magnetic when annealed, becoming magnetic as cold worked. Exhibit extraordinary resistance to stress concentration.

How Stainless Is Fabricated

MACHINING AND CUTTING

Machining Stainless Steel is different, not difficult. Successful practice depends upon the application of proper techniques.



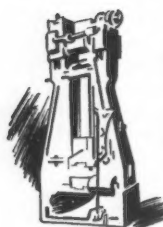
Machining operations require sharp tools rigidly mounted and operated at proper speeds using a cutting fluid, generally sulphur base oil. Attention should be directed to the non-magnetic or 18-8 grades as their machining is rendered very difficult if the tools are allowed to ride (glaze) and harden the surface to be cut.

Maximum machining rates are obtained with the "free machining" grades:

- Rustless 12FM
- Rustless 13-C-35FM
- Rustless 17-C-100FM
- Rustless 17FM
- Rustless 18-8FM

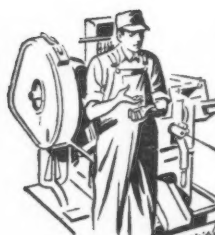
For further information on machining write for Rustless comprehensive booklet, "Machining of Stainless Steels", now in preparation.

FORGING



The forging characteristics of Stainless Steels depend upon composition. Selection of suitable grades and proper control of forging temperatures insure successful forging of these alloys. With proper technique, Rustless Stainless Steels are readily forged in complicated shapes, such as dental and surgical instruments, valve bodies and table knives.

COLD WORKING



Rustless Stainless Steels are more resistant to cold deformation than ordinary steels, and more energy is required to shape them. However, they are readily cold-drawn, cold-headed and swaged when proper techniques are used. The straight chromium grades do not harden appreciably when cold-worked, but the chromium-nickel grades harden rapidly.



WELDING

Rustless Stainless Steels, except the high-carbon and free-machining grades, can be welded by the electric arc, oxy-acetylene, atomic hydrogen and resistance methods. The chromium-nickel grades are frequently chosen because of their particular ease in welding and unusual ductility in the welded condition. Weldments of heavy sections, or those subject to severe corrosion which cannot be annealed after welding are generally made from Rustless 18-10Cb—Type 347 or Rustless 18-10 Ti—Type 321.



SOLDERING

Rustless Stainless Steels are readily soldered by ordinary methods and the only requirement is a soldering flux which will dissolve the passive film present.



RIVETING

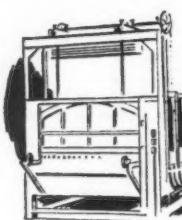
When using rivets of Rustless Stainless Steels, certain properties, such as work hardening, air hardening and grain growth at given temperatures, must be given consideration.

HEAT TREATMENT

Rustless Stainless Steels of the "Martensitic" or hardenable types respond to heat treatment in a manner similar to low alloy steels. Large sections are hardened uniformly to the center when air cooled from above the critical temperatures.

To attain full advantage of the excellent corrosion resisting and mechanical properties of Stainless Steels, proper attention should be paid to certain heat treating variables. These variables are easily understood and are simply controlled. Complete information can be obtained by writing for Rustless' booklet, "Heat Treatment of Stainless Steels".

Rustless Stainless Steels can be surface hardened by special nitriding methods now commercially available. These methods can be used where the service demands a hard and wear resistant surface and where loss in corrosion resistance can be tolerated.

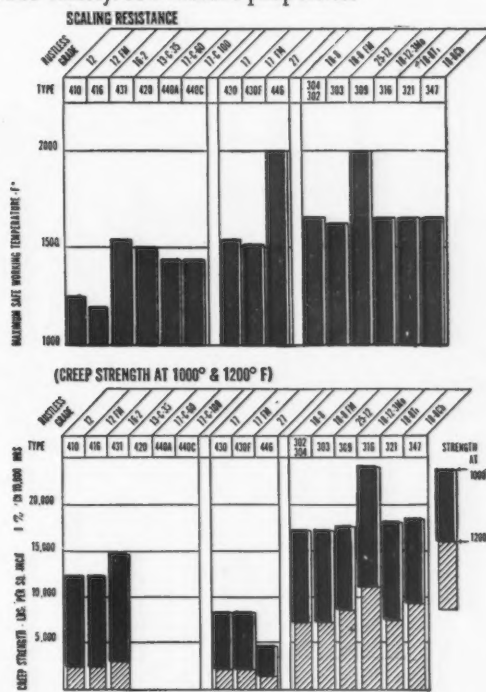
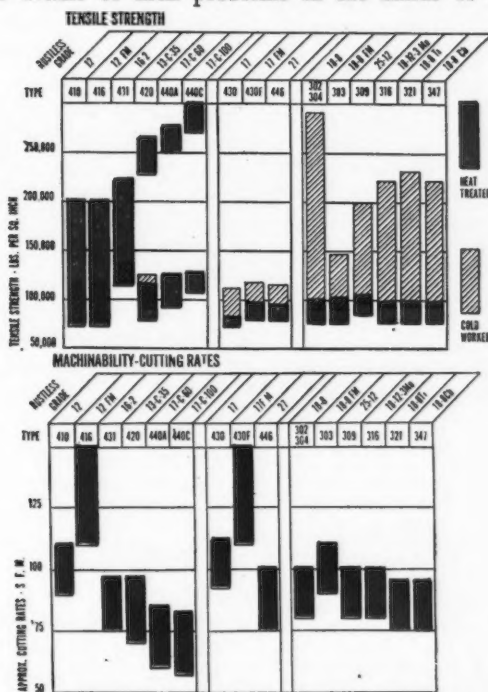


Comparison of Stainless Properties

selection of the proper Stainless Steel involves the evaluation and comparison of the characteristics of each grade with respect to specific functional and fabrication requirements. There is no easy rule to follow. Experience is an important factor, and that is why we urge designers to place the details of their problems in the hands of

Rustless specialized stainless steel engineers and metallurgists.

Below are four charts out of a number shown in the Rustless folder, "Condensed Data on Stainless Steels" (sent free on request). These are for preliminary study only, and illustrate a few of the wide variety of available properties.

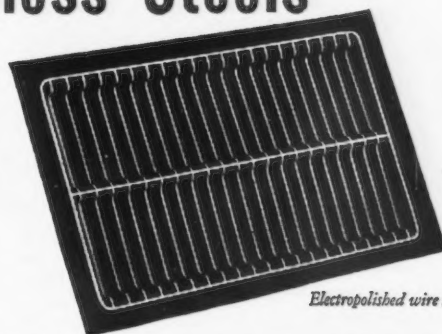


Electropolishing Stainless Steels

New uses for Stainless Steels are appearing as a result of the anodic electropolishing process developed by the Rustless laboratories. Commercial experience over the past four years has shown that many products which heretofore were too costly or impossible to polish by buffing or tumbling can be economically and efficiently cleaned and brought to an unusually lustrous and brilliant finish by this process.

For example, Rustless Electropolishing permits polishing of intricately-formed wire products, resistance-welded wire products (removes spot weld discoloration), parts too small to hold against wheels, deeply-recessed and complex parts, and rough forgings.

Write for further details about this Rustless development.



SALES OFFICES:

BALTIMORE • BUFFALO • CHICAGO
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LOS ANGELES • MILWAUKEE • NEW YORK
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DISTRIBUTORS IN PRINCIPAL CITIES



Producing STAINLESS STEELS Exclusively
RUSTLESS IRON AND STEEL CORPORATION
BALTIMORE 13, MARYLAND

WPB Reports on Use Of Statistical Methods For Improved Quality Washington

• • • Reporting on the use of statistical methods to control and improve the quality of manufactured products with resultant saving of millions of dollars on war production, the WPB Office of Production Research and Development has announced that at a large steel plant by applying statistical methods prior to scarfing of billets before sending them to the finishing mills it was possible to eliminate scarfing on 27 per cent to 71 per cent of the heats, depending on the size of the bars. A saving of many thousand of dollars monthly has resulted, it was said. Scrap was said to have been reduced about 40 per cent, eliminating a serious bottleneck.

In a midwestern plant, the report pointed out, scrap and rework on one metal part produced in volume for the armed services has been reduced from about 20 per cent scrap and about 20 per cent rework to about 0.5 per cent for each through use of quality control, with a saving of about \$124,000 annually. Inspection cost, OPRD reported, has been reduced from 33 per cent of the total cost of the part to 2.5 per cent, saving more than \$400,000 annually. In addition, the report declared, the armed service was able to reduce its resident inspection staff from 24 people to three.

Use of a statistical control chart was said to have resulted in a reduction of assembly errors in one assembly line at a large aircraft parts plant that saved \$350 a day, or about \$125,000 annually.

Armed service requirements for inspection of aircraft bolts, the report stated, were revised after aircraft manufacturers acquired knowledge of scientific sampling methods, and significant economies in war production occurred.

Among current projects relating to quality control being sponsored by OPRD are the magnetic inspection of parts, the devising of statistical control charts using "modified control limits" with wider tolerance than those provided in standard charts and the maintaining of closer controls on the product of multiple-unit machines.

In cooperation with the United States Office of Education of the Federal Security Agency, OPRD has sponsored more than 30 courses on

the application of statistical quality control for executives, technical and production personnel of war plants. The courses have been given at universities throughout the nation and consist of a one-day session for executives to give them a broad understanding necessary for exercising general supervision over industrial quality control functions and an additional seven-day course for assigned personnel on the principles and industrial applications of quality control. More than 1500 persons have taken the full course and 3000 have attended the short sessions. The next course will be given at Northwestern University, Evanston, Ill., from March 14 to 22. A similar course will be given at the University of Iowa at Iowa City from May 16 to 24.

Drop in Cars Wrecked By Auto Graveyards

New York

• • • The number of cars wrecked annually by auto graveyards has dropped again according to statistics released by the Scrap Processors Branch, Salvage Division, WPB. Not many more than half a million cars were scrapped in 1944 compared with over 900,000 in 1943 and 2 million in 1942.

	Cars Wrecked	Cars on Hand End of Period ¹
1942 First half....	1,108,000	490,000
Last half....	935,000	274,000
Total....	2,043,000	.....
1943 First half....	537,000	254,000
Last half....	367,800	279,000
Total....	904,800	.....
1944 First half....	253,520	274,000
² Last half....	250,000	.....
² Total....	503,520	.....

¹ In stock Feb. 28, 1942—918,607.

² Estimated.

COMING EVENTS

April 4-6—SAE National Aeronautic Meeting, New York.

April 12-14—Electrochemical Society, Inc., Philadelphia—Atlantic City Congress, Atlantic City, N. J.

CANCELLED

April—American Zinc Institute, St. Louis.

April 26-27—Annual Conference, Open-Hearth Steel Committee and Blast Furnace and Raw Materials Committee, Iron and Steel Division, A.I.M.E., Chicago.

April 30—May 4—American Foundrymen's Association, Detroit.

May 21-22—American Steel Warehouse Association, 1945 Convention, New York.

May—American Gear Manufacturers Association, general meeting.

May—General Meeting, American Iron & Steel Institute, New York.

Billings Higher But Backlogs Lower in '44 At Westinghouse Co.

Pittsburgh

• • • At the end of 1944 unfilled orders at Westinghouse Electric & Mfg. Co. totaled \$534,652,727, compared with \$821,314,541 at the end of 1943, a decrease of 35 per cent. According to the company, these figures do not include orders for production at Ordnance plants which the company is operating for the Navy.

Net sales billed exclusive of Ordnance plants were \$835,737,004, compared with \$709,342,717 in 1943, an increase of 18 per cent. Orders received in 1944 amounted to \$729,024,122, compared with \$958,967,057 in 1943, a decrease of 24 per cent.

The company's net income for 1944 amounted to \$26,019,097, compared with \$21,401,568 in 1943, an increase of 22 per cent. This amounted to \$8.11 per share of common stock, compared with \$6.67 in 1943.

The average number of employees at Westinghouse in 1944 amounted to 115,425, compared with the average in the previous year of 105,702. At the end of 1944, the company employed 34,224 women. More than 23,500 Westinghouse employees are in the armed service. By the end of 1944, 5620 honorably discharged veterans including some who suffered war injuries were at work at Westinghouse.

According to an engineering survey made by the company to determine the size of the reconversion problem required to meet postwar production, an immediate postwar expenditure of about \$26,000,000 would be necessary. When this program is completed, the company will have about 15 per cent more floor space than before the war and will have production capacity representing an increase of approximately 50 per cent.

Laclede Nets \$318,966

St. Louis

• • • Laclede Steel Co. reports net income for 1944 of \$318,966, out of which a dividend of \$1.30 a share was paid, amounting to \$268,125.

According to the company the government has not found it necessary to renegotiate profits for the year 1943, and no renegotiation liability is expected for last year's operations.

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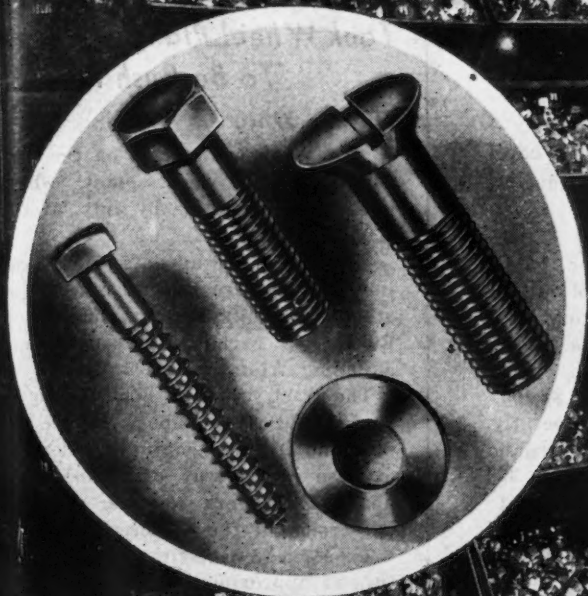
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TYPES OF

EVERLASTING FASTENINGS

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BECAUSE of these large and varied stocks, Harper is known as "Headquarters for Everlasting Fastenings" . . . "Your Logical Source" of non-ferrous and stainless bolt and nut products.

At Harpers the buyer finds three unique and distinct advantages. First, large stocks of all types of fastenings such as bolts, nuts, screws, washers, rivets and specials; second, fastenings in all the commercial non-ferrous and stainless alloys except aluminum, e.g. brass, copper, naval bronze, silicon

bronze, Monel and stainless steel; third, large stocks of metals in bars, rods, wire, strip and other basic forms from which special fastenings can be quickly made according to specifications.

1945 CATALOG AVAILABLE. New in usefulness to the metal industries. 104 pages, 8 1/2" x 11", 4 colors.

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Industrial Briefs . . .

• **SELLS LICENSE** — Clayton & Lambert Mfg. Co., Detroit, has sold to the Navy Department for more than \$150,000 a fully paid license under company patents for manufacture of specially designed tanks for storage of large shells in Naval magazines.

• **MOVES OFFICES**—Local offices of the Jones & Lamson Machine Co. have been moved to the Boulevard Building, 7310 Woodward Avenue, Detroit.

• **BUYS BEARINGS PLANT**—The Cleveland Graphite Bronze Co. has purchased a plant from the Extrusion Metal Products Co., at Bridgeport, Ohio, and will begin producing engine bearings there as soon as possible, according to a company announcement. The plant has 20,000 sq. ft. of floor space, adequate for an estimated production of 1,500,000 to 2,000,000 bearings a month. Approximately 250 men and women will be employed when full production is reached.

• **ACQUISITION** — Walter Kidde & Co., Inc., Belleville, N. J., has announced the purchase of the capital stock of the Youngstown Miller Co., Inc., manufacturers of plastic coaters and oil reclaimers.

• **SETS OPERATION DATE**—With approximately 200 persons to be employed, Rheem Mfg. Co. is scheduled to begin in September the operation of a 75 mm. shell forging plant at Birmingham for the Ordnance Department. Rust Engineering Co. of Birmingham and Pittsburgh has been awarded the contract to alter for Rheem's use an industrial building now used for storage.

• **OPENS OFFICES**—The firm of Baker, Plancon & Gilmore Co., Detroit, has established offices at 7310 Woodward Avenue, Detroit, to represent the Apex Machine & Tool Co., and Buckeye Tools Corp., Dayton; Studebaker Machine Co., Maywood, Ill.; and the Kett Tool Co., Cincinnati.

The organization will cover Michigan and northern Ohio territory.

• **BUYS STOCK CONTROL**—Purchase of stock control of the Cleveland Wire Spring Co., manufacturers of mechanical springs, by the Reynolds Spring Co., Jackson, Mich., for \$1,400,000, was announced recently. Present personnel of Cleveland Wire, consisting of about 350 persons, will continue to operate the two plants. Mr. Lewis will continue as president of the Cleveland Wire Spring Co. which will operate as a separate organization.

• **PLANS AIRPORT** — The Luscombe Airplane Corp., Trenton, N. J., has bought a tract of about 500 acres of level farmland in Texas on which to erect a modern aircraft factory and develop a complete new airport, it was announced by the company.

The firm has acquired this \$100,000 tract to permit further expansion of its facilities for war production of precision all-metal elements for combat and other military aircraft, and development of a peacetime personal flying center devoted to manufacturing, maintenance, and general operations.

• **CHINA LEARNS** — In a group of visiting Chinese engineers who visited various Milwaukee plants recently were: C. Yun, general manager of Central Electric Works of Chinese National Resources Commission; K. P. Pao, director of Mun Kiang Electric Works; P. Y. Loo, technical expert, Ministry of Economic Affairs; M. B. Chow, general manager of Min Shang Engineering & Shipbuilding Co.; H. Huang, director of hydraulic surveying of the National Resources Commission; Y. C. Hsu, manager of power factory, Central Electric Works; T. Y. Liu, manager of Kunming power plant, and K. C. Jen, manager of the Central Works.

Tank Wheel Plant To Be Rush Project

Dayton, Ohio

• • • Work has started on the new \$750,000 tank wheel plant, which must be in operation by July, at the Dayton Rubber Mfg. Co.

To provide an advantageous location for the structure in relation to other plant units, the city and Dayton Rubber will exchange parcels of land adjoining Wolf Creek.

The tract, which is expected to be deeded to Dayton Rubber, lies in low land and will necessitate considerable expense in the way of fill-in. That phase of the work, together with the conversion of the old creek channel, is expected to necessitate an expenditure of approximately \$40,000 on the part of the rubber company. In return it will receive only \$1 for whatever portion of the land that is turned over for Federal Government use.

This latest building project will be one of five added recently to the rubber plant at a total cost of \$1,500,000. A. L. Freedlander, president and general manager, estimated the expansion program will mean more than \$25,000 in additional taxes.

The tank wheel structure will be constructed by the Defense Plant Corp.

Sub-Contractors Filling Open Capacity at Rapid Rate

Cleveland

• • • Recent increases in military requirements are loading many small war plants to capacity and assistance to these plants during February reached an all-time peak aggregating \$67,616,240 in 298 prime and 522 sub-contracts, according to Daniel B. Ford, regional director of the Smaller War Plants Corp., for Ohio, Kentucky, West Virginia, and western Pennsylvania.

Cleveland district small war plants were in front with contracts totaling \$12,245,602, and Cincinnati was next with \$11,876,624. Sub-contract placement showed a 100 per cent increase over the monthly average for the last six months of 1944 and these contracts, awarded to 220 concerns, were valued at \$19,210,602.

Mr. Ford also reported that at present the region has a lot of open welding and fabricating capacity as well as for woodworking items, and that Cleveland, Columbus, Erie, and Pittsburgh have spotty open capacity on screw machinery as well.

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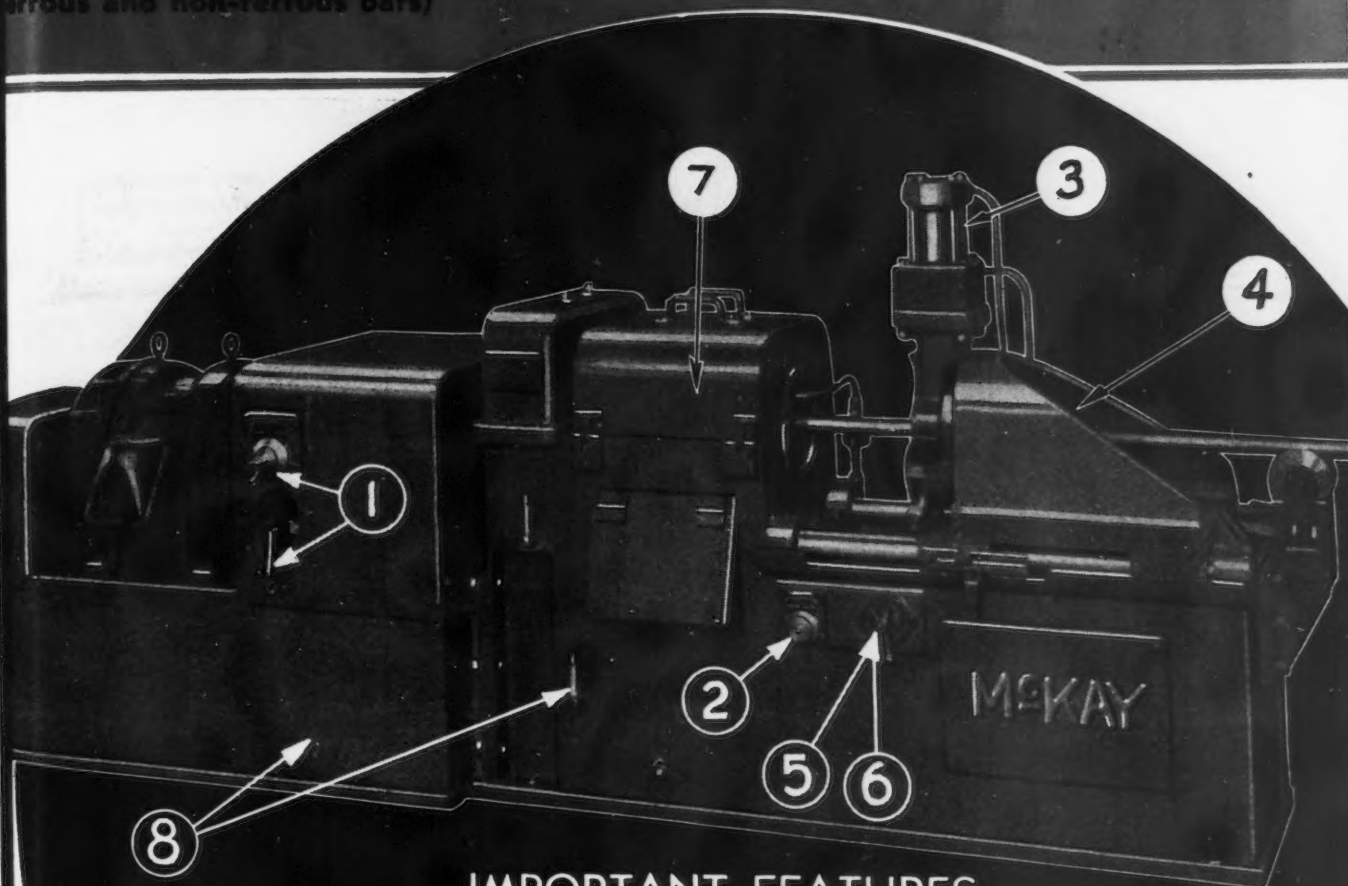
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The New MCKAY

ROTARY HYDRAULIC BAR POINTER COMPLETELY HYDRAULIC AND FULLY AUTOMATIC

Machine designed and engineered for
the Cold Drawn Bar Industry
(ferrous and non-ferrous bars)

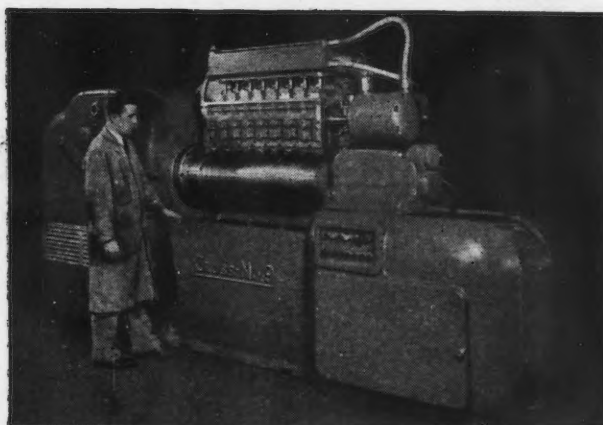
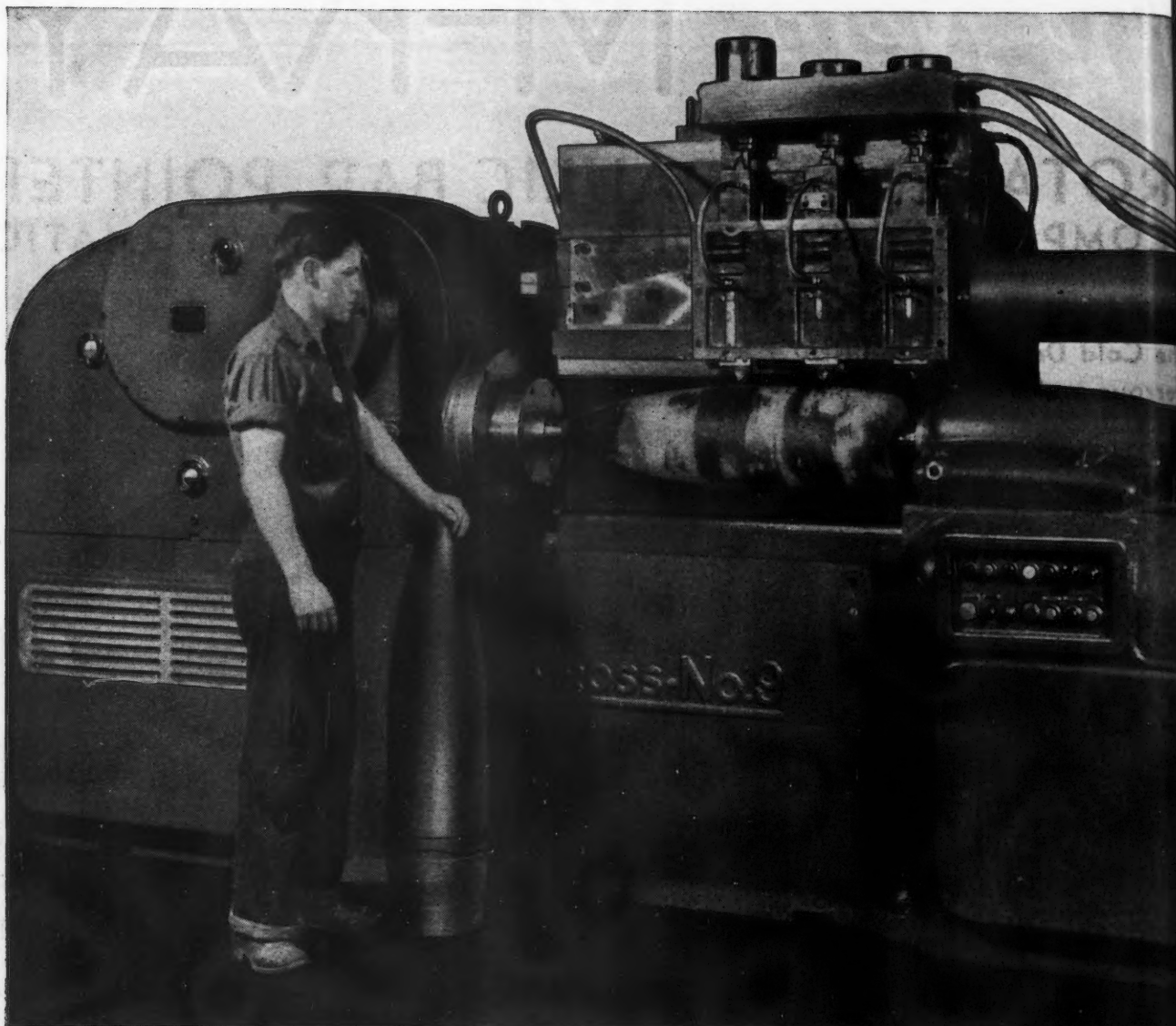


IMPORTANT FEATURES

- | | |
|---|--|
| 1 Finger tip control of tool speeds (from minimum to maximum) | 5 Pre-set length of carriage travel |
| 2 Precision variation of feed control | 6 Automatic rapid return of carriage |
| 3 Hydraulically operated grips | 7 Cutting head fully enclosed in splash proof case |
| 4 Interlocked grip and feed (work is positively gripped before feed begins) | 8 Hydraulic and coolant tanks integral with base. Sight gages indicate fluid level |

The MCKAY MACHINE Company
ENGINEERS AND MANUFACTURERS OF TUBE AND BAR DRAWBENCHES AND BAR SHEARS
YOUNGSTOWN, OHIO

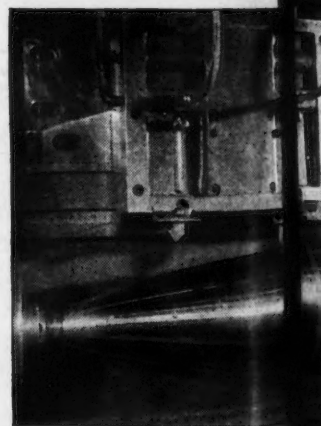
PERFORMANCE RUGGEDNESS PRECISION AND SAFETY



1—In finishing the shell, 2 tools cut as the slide feeds to left.

2—The slide rapid-returns part way and starts feeding to right as a third tool enters the work to produce the bourrilet.

3—Roughing a 240 mm. shell, cutting with 12 tools simultaneously.



CROSS

New York

Chicago

DETROIT

Cleveland

Dayton

The Means to an End...

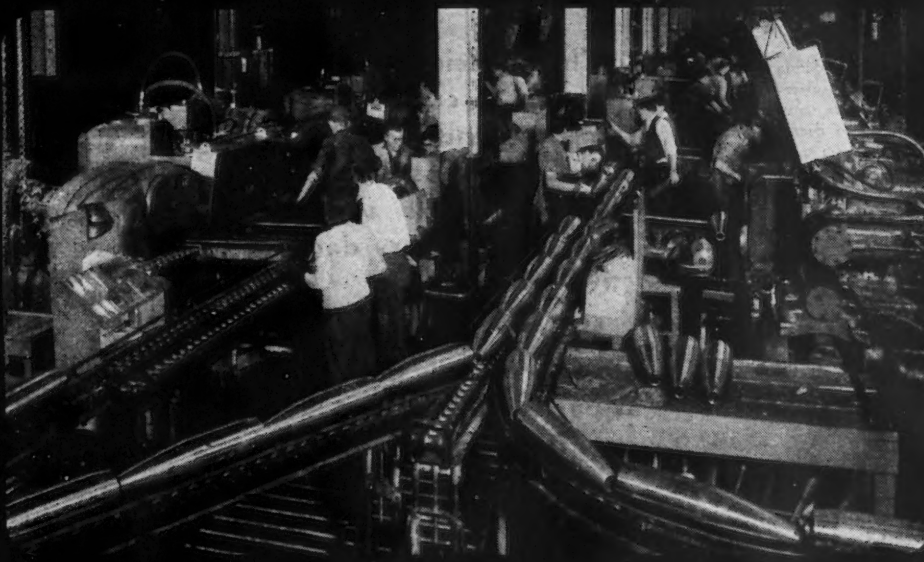
This machine is only the means to an end, which is mass production of shells—the same as the ammunition is a means to an end of the war. What form, size, power or production a Cross Special Machine will have depends on the job requirements. That is the Cross method of supplying machinery.

This machining problem, as presented to Cross by the manufacturers of 105 mm., 155 mm., 8-inch and 240 mm. shells, called for special machines capable of "hogging off" metal continuously to very close tolerances—and using unskilled labor, frequently women, due to the lack of experienced machine operators.

Cross Special Shell Lathes were designed and built around these customers' needs. That they are meeting these requirements is evidenced by the swift, steady flow of shells coming off the production lines, which operate 24 hours a day with whatever help is available.

Cross Engineering Service is offered to you on problems involving milling, drilling, boring, reaming, tapping, turning and grinding. Send for the Cross booklet containing many case histories of Cross Special Machines. A descriptive Shell Lathe Bulletin is also available. Address Department 112.

THE CROSS COMPANY, DETROIT 7, MICH.



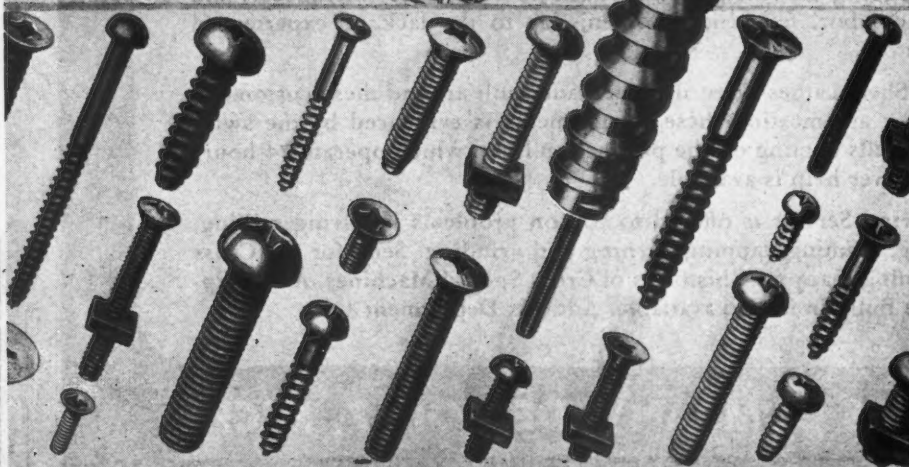
SPECIAL MACHINES

for automatically performing any one or a combination of metal cutting operations
TURNING · MILLING · DRILLING · BORING · REAMING · TAPPING · GRINDING

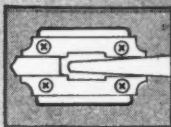
HOLTITE PHILLIPS SCREWS & BOLTS

*meet every styling requirement
in your Post-War products plans*

FASTENINGS FOR
EVERY PURPOSE



IMPROVED STYLE AND APPEARANCE



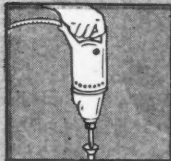
The neat design of HOLTITE-Phillips recessed heads makes them an attractive supplement to decorative hardware or exterior finish.

NO BURRS TO TEAR OR SCRATCH



Driven easily, HOLTITE-Phillips heads do not burr, thus saving filing operations where burrs would tear clothing or injure hands.

CUT DRIVING TIME IN HALF



As bit cannot slip from the HOLTITE-Phillips recessed head, spiral and power drivers can be safely used even on finished parts.

Though scientifically designed to cut fastening time 50% and more, HOLTITE-Phillips recessed head presents a design that meets every decorative requirement.

Neat in appearance with heads in any position, a quarter turn will line them up for added attractiveness and symmetry. Furnished in any metal with plated or painted finish to match any material.

Warime conservation makes it impossible to send catalogs unless requested on your company letterhead

CONTINENTAL SCREW CO.

New Bedford, Mass., U.S.A.
BUY MORE BONDS

NEWS OF INDUSTRY

Ingot Production Up At Sheet & Tube Co

Youngstown, Ohio

• • • The Youngstown Sheet & Tube Co. in 1944 produced steel ingots at a rate of 106.4 per cent of capacity compared with 100.1 per cent in 1943. An all time high in actual production was established in 1944 when the company turned out 4,299,527 net tons of steel and 3,537,462 net tons of pig iron.

Net sales of the company in 1944 amounted \$238,816,965, compared to \$224,879,404 in 1943. Net income for 1944 amounted to \$7,944,922, compared with \$8,037,442 in 1943, or \$42 a share of common, compared with \$4.31 in 1943.

The company's average working force in 1944 was 19,889 and more than 8500 employees have entered the armed forces. According to the company probably many months will be required to compute back wages voted by the WLB which are applicable to the 1944 operations, but provision has been made in the accounts for the estimated cost of compliance.

Indicating drop in few inventories, the company as of Dec. 31, 1944, had stocks of coal, coke and other fuels valued at \$1,942,204, compared with \$2,216,098 at the end of 1943 and \$3,812,535 at the end of 1942. Scrap inventories at the end of 1944 were valued at \$1,059,228, compared with \$2,566,724 at the end of 1943. The value of total inventories including raw materials as well as finished products and supplies amounted to \$34,850,533 at the end of 1944, compared with \$41,133,678 at the end of 1943, and \$40,518,234 at the end of 1942.

Company's Net Profits Drop

Cleveland

• • • Although its sales volume reached an all-time high and operating profits increased, the net profit for 1944 of Basic Refractories, Inc., showed a slight decline from the previous year, according to the annual report just released.

Decline in net earnings was due entirely to increased taxes, according to H. P. Eells, Jr., president of the company. Taxes for 1944 totaled \$245,000, nearly one and a half times the earnings figure of \$176,967. In addition, the company paid the Federal Government another \$173,715 as rent on a DPC kiln plant built on its property.



Blessed Event



The Howell Protected Type Motor, shown, gives complete protection against dripping liquids, metal chips and other falling particles. Completely streamlined—utilizing non-breakable steel frame—malleable or steel base—cast iron end plates and cast iron, weatherproof terminal box are standard construction features. Special horizontal and vertical mountings are available.

Available in sizes 5 H.P. and smaller. Other sizes and types available up to 150 H.P.

The reception given a new Howell Motor in any plant comes right from the heart. For when a Howell of any size or type is delivered, you can be certain of two things:

1. Every Howell Motor is built of the finest materials, is statically and dynamically balanced, and thoroughly insulated throughout—
2. Our steadfast policy of maintaining pre-war standards, with no compromise in quality, is being rigidly maintained.

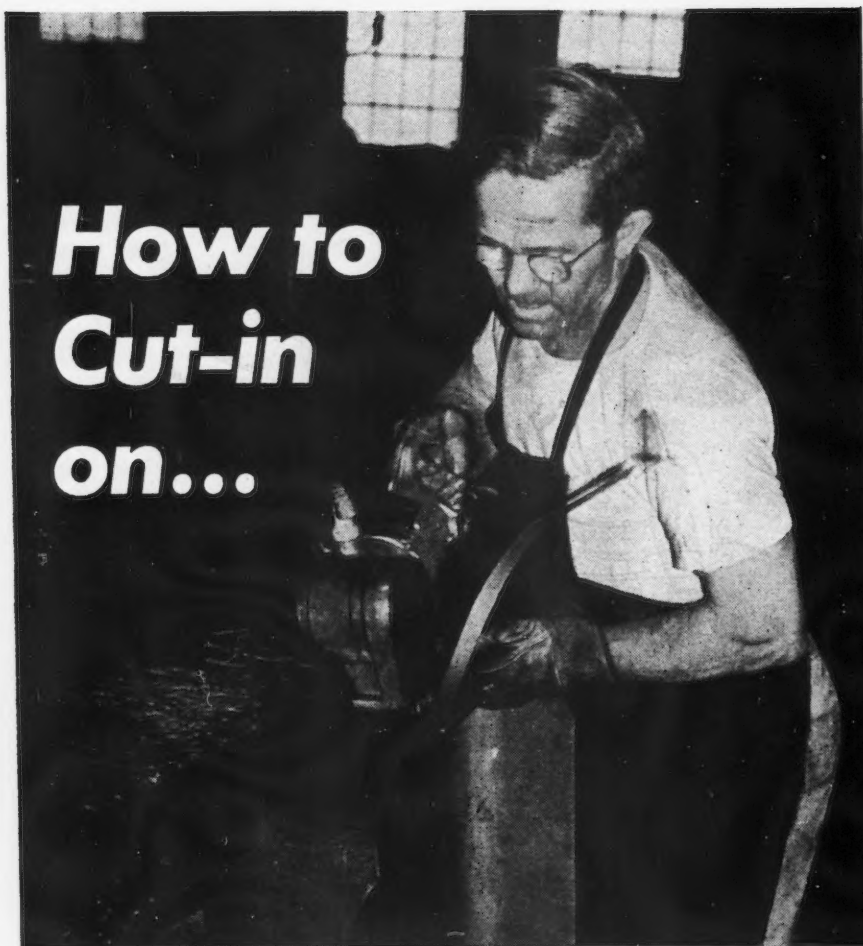
Yes, we are swamped with orders today. The delivery situation in the entire electric motor industry is serious. But we fully recognize our obligations, and we are putting forth our maximum efforts to see that Howell Motors are distributed among those users whose needs are most vital to the war effort.

Buy Horsepower by

HOWELL ELECTRIC MOTORS COMPANY
HOWELL, MICHIGAN

Manufacturers of Quality Motors Since 1915

**How to
Cut-in
on...**



UNISHEARS Profits

This is one of the main reasons why Unishears will mean less time and labor spent in cutting heavy metals in your plant. Unwieldy sheets or forms, once carted to a bench shear, are now efficiently and speedily cut to shape by a portable Unishear anywhere on the job.

Check your production line and simplify operations with Unishears. Stanley Unishear No. 144A, illustrated above, will cut 12 gauge hot rolled steel at a speed up to 15' per minute as fed. It cuts straight lines, curves or angles without burr or distortion. Four other portable types have capacities to 18, 16, 14 and 8 gauge steel.

Write for Catalog descriptive of the complete line of electric tools for industry. Stanley Electric Tools, New Britain, Connecticut.



STANLEY UNISHEARS
Electrically Driven Metal Shears

NEWS OF INDUSTRY

Jersey Mine Project Written Off by DPC

Conshohocken, Pa.

• • • Construction work on the Ringwood Iron Ore Mine project at Ringwood, N. J., ceased recently when the agreement between the Alan Wood Steel Co. and the DPC was terminated because the WPB held the project was no longer essential to the war effort.

According to the company's financial report it will act as custodian for a period not exceeding nine months from the date of termination, which was Jan. 26, 1945. The Ringwood Mine, which was to have yielded low grade magnetite ore for beneficiation was utilized during World War I. The rehabilitation had been started as a war project.

According to Alan Wood, operations at the McKinley iron ore vein at the Oxford properties in New Jersey had been abandoned. It was said the nature of the ore body and character of the ore did not bear out the favorable indications of the prospecting of the vein.

Average number employees at Alan Wood for 1944 amounted to 2993 compared to 3187 in 1943. Inductions into the armed forces to date have amounted to 823 employees. The company reported a net income of \$136,991 in 1944. Charge off due to the abandonment of the McKinley ore vein amounted to \$404,790.

Iron Output Up at Woodward Birmingham

• • • After an additional reserve of \$180,000 for general contingencies had been provided, net earnings of Woodward Iron Co., Woodward, Ala., totaled \$843,767 for 1944 or \$2.50 per share. Net earnings of the company for 1943 totaled \$1,008,472 or \$3 per share.

In a report to the stockholders, President H. A. Berg said in part:

"Your company's blast furnace operations were continuous except for seven days lost in partial relining and repairing No. 2 Furnace in July, and nine days lost in partial relining and repairing No. 3 Furnace in November. Production in 1944 was at a lower rate due to falling off in demand during the period from Feb. 1, when the War Production Board terminated allocations, to Dec. 1, when the demand for pig iron increased markedly, due to accelerated demand for war production. Total sales for the year were \$11,256,453 as compared with \$11,800,694 in 1943 and \$12,612,147 in 1942."

Now...

More Forgings Per Sinking with the New BARIUM DIE STEEL



A New Development

BARIUM Die Steel is the result of a new and special analysis perfected in Barium's laboratories and plant by one of the country's leading steel makers.

Longer die life and lessened die cost is assured because of the high quality and controlled grain flow and uniform structure of BARIUM Die Steel.

From raw material to finished product, Barium's *unified control* system embraces expert melting, forging under large presses and hammers by skilled workmen, modern heat-treating and tempering supervised by metallurgical experts.

While no more costly than competitive makes, BARIUM Die Steel, due to its unsurpassed quality and longer resistance to wear, has enabled users to get *more forgings per sinking* and thus substantial savings in die costs.

Production records of Barium's customers, from large and small forge shops, testify to the finer performance and economies of BARIUM Die Steel.

Your inquiries concerning BARIUM Die Steel will receive prompt attention. One of our representatives will be glad to call upon request. Write or wire...

BARIUM
STEEL CORPORATION
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Producers of Carbon, Alloy, and Stainless Steels — Heavy Forgings — BARIUM Die Steel and Die Blocks — BARIUM Piston Rods — BARIUM Hammer Rams.

ADD PRESSURE SEAL



to quicker fit...

THIS MAY BE NEWS to you . . . You can get all the advantages of Laminum *plus* the sealing of oil and pressure in bearings . . . in *babbitted* Laminum shims. The babbitt lugs are securely locked into the Laminum. Details on request.

Laminum shims are cut to your specifications. For maintenance work, however, shim materials are sold through industrial distributors.

Laminated Shim Company, Incorporated
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LAMINUM
THE SOLID SHIM THAT *peels* FOR ADJUSTMENT

Rustless Sales Go Down With Output

Baltimore

• • • Net sales of Rustless Iron & Steel Corp. in 1944 amounted to \$28,274,754, compared with \$32,996,894 in 1943. Changing war demands in 1944 coupled with stringent government restrictions on the use of stainless steels, resulted in a decline in output for that year, according to the company. Net earnings in 1944 were \$1,831,780, compared with \$2,236,492 in 1943.

As a result of renegotiation proceedings for 1942, the company has charged \$154,000 to earned surplus in 1944 as a provision for net refund to the government. The company believes that on the basis of the 1942 renegotiation, the amounts refundable for 1943 and 1944, if any, will not be material.

Rustling Mining Corp. discontinued its operations in 1944 and sold most of its remaining property. This subsidiary had been organized to secure a reserve supply of chrome ore and for several years produced chrome ore concentrates.

According to the company no production or time was lost in labor disputes and no complaints or grievances had to be carried beyond the supervisory level for settlement.

United Engineering Net Down Pittsburgh

• • • United Engineering & Foundry Co. reports for the year 1944 a net profit of \$2,350,351 compared with a net profit of \$2,754,517 in 1943.

The company said its policy is to accept orders with a profit margin in accordance with that previously acceptable to the Price Renegotiation Board and since no refund was found due under renegotiation for the year 1943, no provision has been made for further renegotiation of 1944 profits.

The past year was spent in a 100 per cent production effort to end the war, F. C. Biggert, chairman, and K. C. Gardner, president, point out in the report, and, "on account of our temporarily financing many new facilities for the production of vital war products, it was found advisable to borrow \$1,000,000 against a revolving bank credit of \$5,000,000 currently available." It was explained by the company officials that the current order backlog of United Engineering is in excess of \$40,000,000.

A NEW CATALOGUE THAT WILL HELP YOUR PRODUCT PLANNING

STANDARD PRODUCTS

The Standard Products Co., manufacturers of thermo-plastics, thermo-setting plastics, molded mechanical rubber goods, metal stampings, glass run window channel, munitions and automobile hardware, have compiled a comprehensive brochure of their diversified manufacturing.

The new Standard Products Co. Catalogue is profusely illustrated and offers many ideas to manufacturers in the use of plastics, steel stampings, and molded rubber.



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Please forward me a copy of your latest catalogue.

Thank you.

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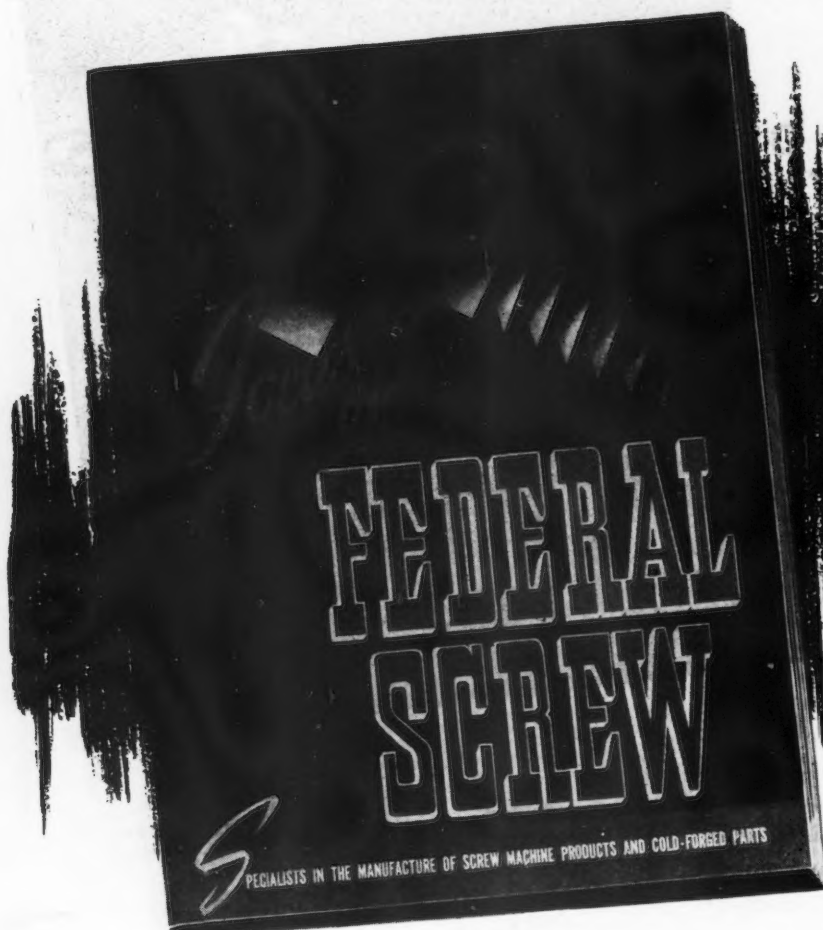
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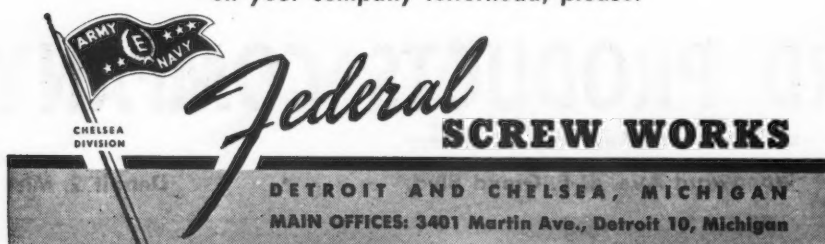
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SCREW MACHINE PRODUCTS



This large illustrated booklet shows at a glance what Federal Screw Works can do in the contract manufacture of screw machine products and cold-forged parts. There are many full-sized photos and sectional drawings of typical parts we're producing, involving all screw machine and secondary operations, plating, cold upsetting, etc.—the sort of work we can do for you to simplify your production problems—and a quick pictorial trip through the plant shows the facilities available to do it.

You'll be interested! Send for your free copy today
—on your company letterhead, please.



NEWS OF INDUSTRY

Employee Total Off At Crucible Steel

Flemington, N. J.

• • • The average number of employees of Crucible Steel Co. of America during 1944 was 24,710 compared with 27,271 in 1943, the decrease being due mostly to manpower shortage. This shortage was so acute at some of the company's plants that premium overtime payment amounted to \$6,612,000 in 1944.

Net income for 1944 was \$3,926,893, compared to \$4,949,696 for 1943. This is equivalent to \$12.32 for each share of 5 per cent cumulative convertible preferred stock outstanding at the end of the year compared with \$15.33 for 1943. After payment of the full dividend on preferred stock it is equivalent to \$5.23 for each share of common stock outstanding at the end of the year compared with \$7.43 for 1943.

Gross sales at Crucible Steel for 1944 amounted to \$184,536,021, compared with \$196,646,344 in 1943. However, revenue from sales in 1944 is shown before renegotiation. The latter applying to 1943 reflected a reduction in total sales amounting to \$12,789,446.

According to the company the WLB directive on shift differentials and extended vacation plan for 1944 cost approximately \$1,800,000. The company reports that no serious loss of production was suffered during the year as a result of work stoppages.

Continental Sales Are Up Slightly

Kokomo, Ind.

• • • Continental Steel Corp.'s net sales for 1944 totaled \$22,474,066, compared with \$22,264,078 in 1943. According to the company sales in the fourth quarter of 1944 were almost equivalent to those made in the second quarter.

Total estimated cost to the company for back pay on shift differentials and additional vacations for the year 1944 was set at \$262,600. The company's 1944 payroll amounted to \$8,130,196, compared with \$7,010,628 in 1943.

Average number of employees in 1944 was 2804, compared with 2639 in the preceding year. Although the company was able to reopen its Indianapolis plant during the second quarter of 1944, it is still impossible to utilize its production facilities fully

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MANUFACTURING CONTROL

THE KEY TO UNIFORM CARBIDES

THE art of manufacturing uniform cemented carbides requires the same "exceeding care" exercised by the talented research men who established the fundamental principles and practices of this highly specialized branch of metallurgical science. That is why Kennametal is subjected to precise control throughout every stage of its manufacture, by means of scientific instruments in the hands of skilled technicians. The objective of the chemical and metallurgical checks of processing is three-fold:

First, to produce cemented carbides that will exactly suit predetermined requirements of differing character.

Second, to assure that the desired characteristics of finished products are uniformly maintained.

Third, to form the basis for continued research looking to still further improvement in the properties and applicability of Kennametal.

● The invention and development of Kennametal—a scientific achievement—has led to corresponding useful arts. Kennametal's ability to cut hard metals with sustained accuracy, at greatly increased speed, has made major contribution to the technique of high production machining and milling. Its unique wear-resistant properties have created opportunity which many manufacturers have seized upon to give their products greater serviceability.

The technological advancements that accompany the use of Kennametal serve to suggest the tremendous potential benefits to society that are always inherent in a system under which inventive genius is granted the rights, and given the means, to encourage full utilization of its talent. •

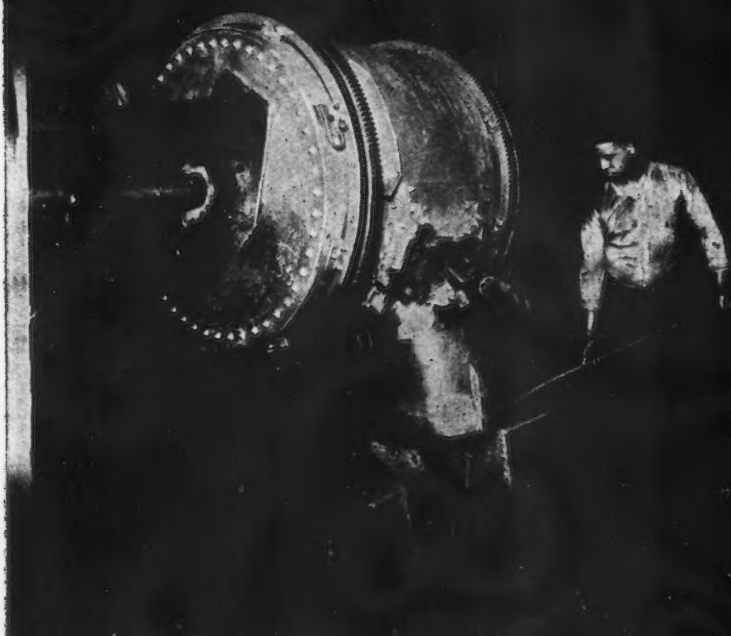
Typical KENNAMETAL Products



"Our metal losses run between .4% and .5% with a Detroit Rocking Electric Furnace"

A Foundry producing intricate bronze parts with a Detroit Rocking Electric Furnace Wrote recently, "Our principal alloy is 78-79% copper 2½% tin, 10% lead, 8-9% zinc, 0.5% nickel. Tests consistently showed the metal losses during melting run between .4% and .5%."

Records in scores of foundries show similar low metal losses and many other advantages. Detroit Electric Furnaces require less labor and produce more pounds of perfect castings per man-hour. They produce as many as 8 ferrous or 16 non-ferrous heats in one eight-hour day. Because they allow precise metallurgical control of any formula, Detroit Furnaces assure superior metallurgical results. Built in capacities from 10 to 8,000 lbs. Write today for further facts.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

NEWS OF INDUSTRY

due to the lack of adequate and skilled workmen, according to Continental Steel.

Net earnings for 1944 amounted to \$508,661 equivalent to \$2.54 a share on common, compared with a net income in 1943 of \$762,610 or \$3.46 a common share.

American Brake Shoe Reports on Earnings

New York

• • • Net earnings of the American Brake Shoe Co. for 1944 were \$2,717,174 or \$2.77 per common share after deduction of \$514,500 in preferred dividends, compared to \$3,111,658 or \$3.38 per share in 1943.

Shipments in 1944 of Brake Shoe and subsidiaries were \$87,752,250, a reduction of \$1,318,106 from the previous year. Labor shortages, affecting practically all plants, in even more serious degree than during 1943, lowered production by approximately \$7,000,000. On the other hand, it was stated, absenteeism and labor turnover were low.

Postwar Price Setup Periled by Civilian Manufacturing Costs

New York

• • • The tremendous rise in output per man hour and the sharp decline in unit labor costs in recent years in war industries have not been paralleled in civilian industry, where there were no significant gains and some declines in productivity while unit labor costs rose, according to the National Industrial Conference Board. These trends according to the Board, constitute a serious, but little-discussed, threat to the postwar price structure.

Wage costs per unit of product for all manufacturing are found to have mounted steadily since 1941, and in 1944 stood 39 per cent higher than in 1939. The cost of raw materials used by manufacturers rose 60 per cent in the same period. Meanwhile, as price controls were steadily broadened, prices of finished manufactured goods were stabilized and in 1944 were only 25.4 per cent higher than in 1939.

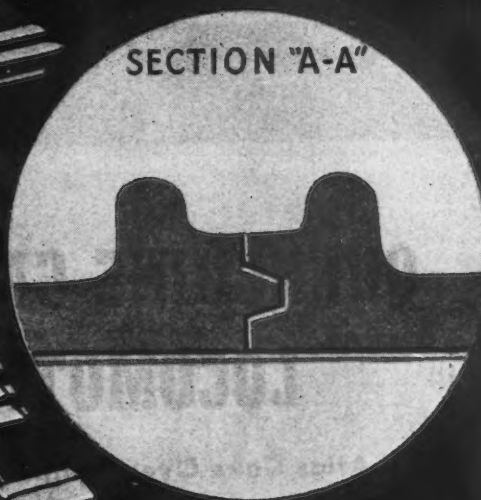
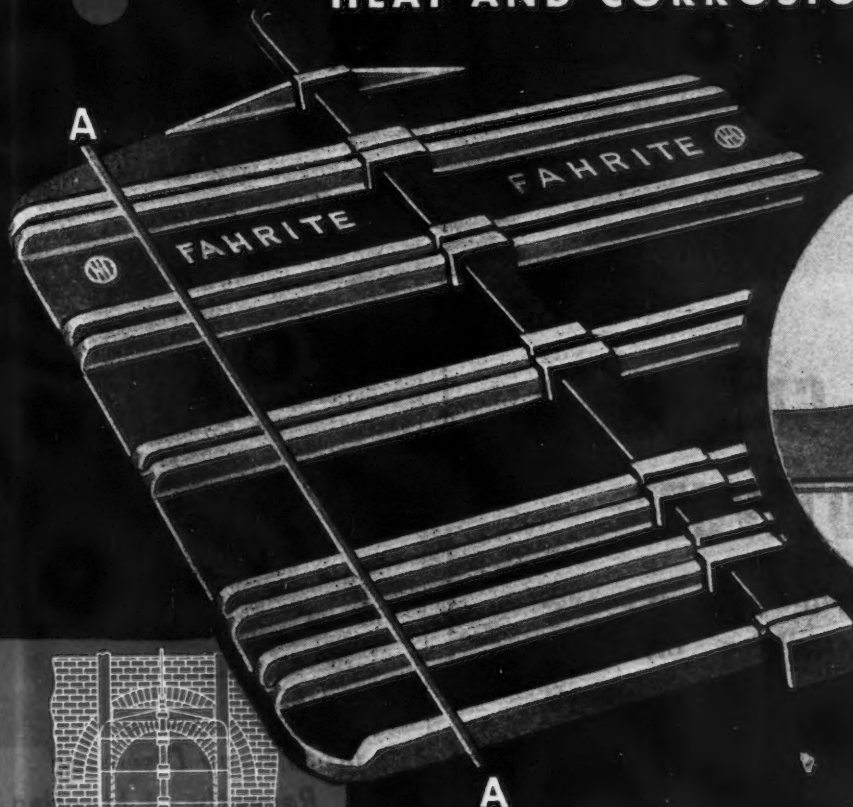
Between 1939 and 1943, the Board reports, manufacturing payrolls more than tripled, production rose about two and a half times, while the number of man hours worked fell a little short of doubling.

Preliminary estimates for 1944 indicate that payrolls continued to

Reduce installation and maintenance costs
with HEAT SAVER VALVES made of

FAHRITE

HEAT AND CORROSION *Alloys*



Here's Why They Are Better:

- No water cooling—saving water, piping and pumping costs.
- No accumulation or coking at seat due to cooling.
- No failure due to muddy or acid water.
- Lower B.T.U. loss.
- Lower installation and maintenance costs.
- Simplified, less costly mechanisms.
- Lighter and easier to operate.
- Do not grow, warp or crack.
- Do not oxidize or corrode.

The Ohio Steel Foundry Co.

LIMA & SPRINGFIELD, OHIO

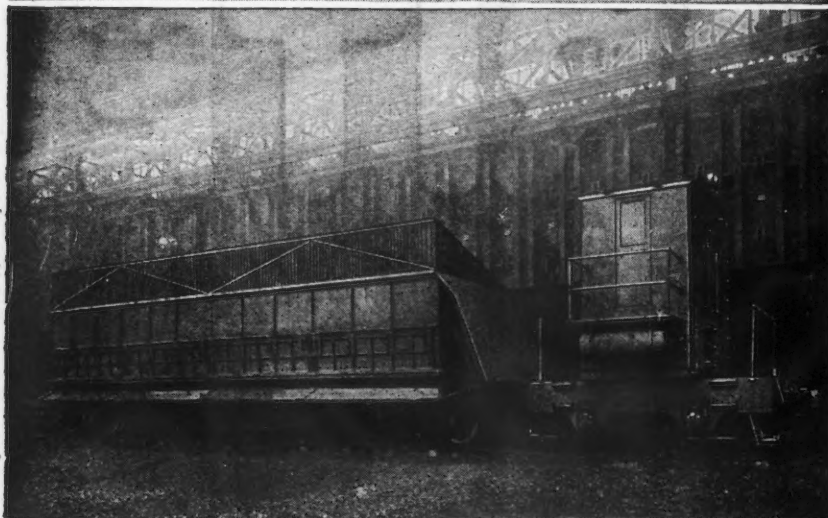


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FOUNDERS
MACHINISTS



Free enterprise is the only way to constantly higher American living standards.

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All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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Locomotives for

Switching and Interplant
Haulage

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The ATLAS CAR & MFG. CO.

ENGINEERS

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1100 IVANHOE RD.

CLEVELAND, OHIO, U. S. A.

NEWS OF INDUSTRY

increase, although production and man hours declined.

Gains in productivity were greater than the rise in payrolls in industries producing war materials, so that unit labor costs were reduced it was said.

The study finds that the situation has been far different in civilian industry: "In all the twenty-five civilian industries for which data are available, unit labor costs were higher in 1943 than in 1939."

With the prices of finished goods virtually stable, and with labor costs per unit and raw materials prices advancing sharply, the study finds that a serious threat to the postwar price structure is being ignored in current discussion.

"The deterioration in the relationship of wage costs to prices in manufacturing has high inflationary potentials," the Board reports.

"Public attention has been largely directed to the demand aspects of the inflationary situation, emphasizing primarily the excess of purchasing power in the hands of consumers as compared with a stable or dwindling volume of consumer goods. Relatively little attention has been directed to the influence of higher costs of production, including higher basic wage costs, upon the postwar price structure," it was said.

Highlights of Powder Metallurgy Discussed Recently at Meeting

• • • Powder metallurgy offers a means of utilizing various properties of metals to their best advantage and is a vital element in the production and control of hundreds of millions of dollars worth of products per year in tungsten products alone, said Dr. Zay Jeffries, of the Plastics Division of the General Electric Co., Pittsfield, Mass., in the first annual medal lecture of the Powder Metallurgy Laboratory of Stevens Institute of Technology, recently. Dr. Jeffries was the first recipient of the newly established annual powder metallurgy medal of the institute.

"A good example of the application of powder metallurgy is the cemented carbide," said Dr. Jeffries. "This material, which consists essentially of hard particles of tungsten carbide sintered with a small quantity of metallic cobalt, utilizes the tremendous hardness of the carbide for

Lengthen Service Life ...regardless of unit size!



Increases Result/Dollar Ratio...

In products and applications... from a wrench to a railroad... records show that a little Nickel goes a long way to lengthen product life, to reduce bulk and deadweight, and to save maintenance costs.

When compared with costs involved, metals to which Nickel is added invariably rise sharply in service value... due to improved performance.

Nickel imparts strength, hardness, toughness, resistance to corrosion, heat and abrasive wear. In all fields of industry Nickel offers significant advantages. Send us details of your problem for our recommendations.



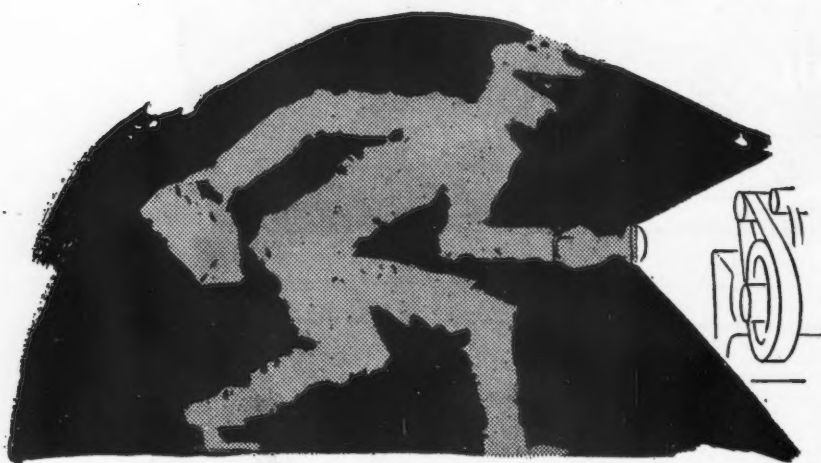
4 TIMES LONGER LIFE

Eight years' service instead of two, was obtained by a large chemical company through specifying Nickel cast iron in this 8-ton ring. Plain iron used here corroded and eroded $\frac{1}{2}$ " per year. This Nickel alloyed iron wears less than $\frac{1}{8}$ " in the same time.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

RUST is a ROBBER!



TECTYL KEEPS IT OUT

One Quick, Easy Precaution...

You take protective measures against theft of your valuable equipment or materials. Don't let *rust* ruin it right under your nose! You can **STOP** destructive corrosion by simply spraying, dipping, brushing, or flushing metal surfaces with Tectyl—it *seals* out moisture for as long as two years. Tectyl leaves a thin, transparent film; you can always see its protection. A little Tectyl covers a lot of metal, and comes off clean and quick with kerosene.

One of Five Specialized Types

will fit your special need—whether you're packaging for overseas shipment, laying up for reconversion, or fighting rust in plant operation. Tectyl protection is tested, proven, *positive*. Write today... tell us your own corrosion problem, and we'll send you a Tectyl bulletin with complete application data.

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Finest Lubricating Oils Since 1866

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Cincinnati 2, Ohio

Refinery at Butler, Pennsylvania

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New York - Atlanta - Detroit - Chicago - Los Angeles - Vancouver - Washington, D. C.

118—THE IRON AGE, March 22, 1945

NEWS OF INDUSTRY

cutting and the wear-resistant properties and it utilizes the toughness of cobalt to keep the hard, brittle tungsten carbide in one piece in service.

"Another example of the use of powder metallurgy is in the production of tungsten rod and filaments for the lamp, radio, electrical contact and other industries. In this case, the melting point of tungsten is so high that no satisfactory method has ever been found of melting and casting it into ingots. The tungsten powder is produced by reducing tungsten oxide with hydrogen. The powder is pressed into briquets and heated by the passage of electric current to a temperature near 3200 deg. C. At this temperature the briquet consolidates into an ingot which is then worked into rod and wire. Not only is powder metallurgy practically necessary for shaping tungsten but by adding certain ingredients to the powder, vital grain size control is effected which, so far, has been found impossible to duplicate by the fusion method.

"Thus, the use of powder metallurgy in tungsten products alone is a vital element in the production and control of hundreds of millions of dollars' worth of products per year, but the magnitude of the industries depending on these tungsten products is small as compared with the savings effected. For example, a calculation made a few years ago showed that in the United States alone it would have required \$2,900,000,000 more to produce the amount of light from carbon filament lamps which was then being produced from tungsten filament lamps. Also, it has been estimated that the use of cemented carbides for cutting tools, wire drawing and other dies and wear-resistant parts makes possible the production in five days that which would require six days if the more conventional tool materials were used. No other way is known at the present time to make this cemented carbide or products which even approach them in effectiveness except by the use of powder metallurgy."

Correction

• • • In the March 8 issue of THE IRON AGE it was incorrectly stated that the late W. H. Ridgway had been founder and president of the American Iron & Steel. He was an associate member of the Institute.

HE KNOWS WHAT'S RIGHT IN POWER DRIVES



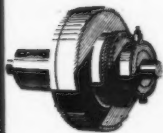
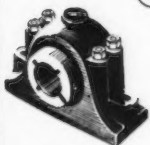
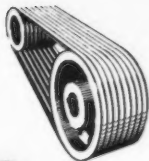
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He's a specialist in putting power to work, graduate of a factory course. That insignia on his lapel means he has proved his qualifications to prescribe the most efficient power drive to meet your needs. He can show you new and better ways to put *all* your power into the job.

His knowledge and experience are backed by America's broadest line of mechanical power transmission equipment—Dodge precision-built bearings, sheaves, pulleys, clutches and other drive components. Transmissioneered means advanced design in power drives.

Transmissioneering service is nation-wide—there are 210 Dodge factory graduate Transmissioneers in principal cities. Whenever you have a problem in power application, call a Transmissioneer—your local Dodge distributor. He has the latest answer. Often your immediate needs can be supplied from local stock.

DODGE MANUFACTURING CORPORATION, MISHAWAKA, INDIANA, U. S. A.



DODGE

MISHAWAKA

THE RIGHT DRIVE FOR THE JOB

THE IRON AGE, March 22, 1945—119

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Difficult Chip Loading Problem Solved by A-F Skip Hoist!



● **PROBLEM:** To load salvaged steel turnings or chips into gondola cars. **COMPLICATION:** Because the plant building was located very close to the railroad tracks, the working space was extremely narrow. When done manually, the loading operation was unhandy, slow, fatiguing, costly.

Because of the narrow space, a vertical type A-F Skip Hoist (also the most economical method of handling ashes, both hot and cold) was installed. Now, operators discharge chips into the Skip

Hoist bucket, located ten feet below the railroad tracks. The A-F Skip Hoist elevates and discharges them into the cars quickly—economically—efficiently.

This is another example of how materials handling systems and products handling systems engineered by Alvey-Ferguson save time, reduce employee fatigue, increase production, and lower costs. Whatever your problems of handling materials, parts, products or packages, we can help you solve them. Write today for literature.



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CONVEYING EQUIPMENT

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METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

NEWS OF INDUSTRY

Canadian Shipyards To Build China Coasters

Ottawa

... C. D. Howe, Minister of Munitions and Supply, announced that Canadian shipyards will begin work on a recent order for 35 China Coasters about the beginning of May. These cargo vessels are of two types, 1350-tons and 350-tons. Of the 15 1350-tonners on order, six will be built by Burrard Drydock Co., Vancouver; three by North Van Ship Repairs, Vancouver; four by Victoria Machinery Depot, Victoria; and two by Prince Rupert Drydock & Shipyard, Prince Rupert, B. C.

Of the 20 350-tonners on order, five will be built by Geo T. Davie Co., Lauzon, Quebec; five by Morton Engineering & Drydock Co., Quebec; four by Collingwood Shipyards Ltd., Collingwood, Ontario; three by Port Arthur Shipyards Ltd., Port Arthur, Ont.; and three by St. John Drydock & Shipbuilding Co., St. John, N. B.

In addition to the above, Mr. Howe announced that additional orders have been placed for transport ferries, the orders being placed as follows: Burrard Drydock Co. Ltd., Vancouver, five; North Van Ship Repairs, Vancouver, two; West Coast Shipbuilders, Vancouver, four; Yarrows Ltd., Victoria, one; Canadian Vickers Ltd., Montreal, three; Marine Industries Ltd., Sorrel, Que., two; Davie Shipbuilding Co., Levis, Que., three.

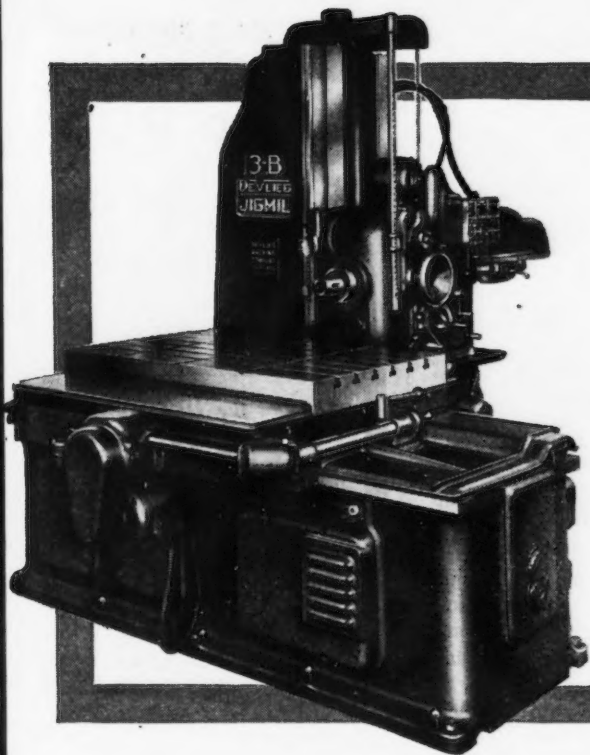
Sharp Manpower Drop Impeding Foundries

Washington

... Executive Vice-President W. W. Rose of the Gray Iron Founders' Society, Inc., recently addressed a telegram to War, Navy, WMC, Selective Service and other government officials declaring that indications are that further withdrawal of semi-skilled and skilled workers from the foundry industry may entail disaster.

Urged to give serious consideration to the situation and the danger it threatens, Mr. Rose called the attention of the officials to the fact that the Selective Service System continues to drain increasingly essential, indispensable and irreplaceable semi-skilled workers from the industry.

He asserted this is being done despite the provision of amended Local Board Memorandum No. 115 that registrants aged 18 through 29 may be retained or placed in deferred classes.

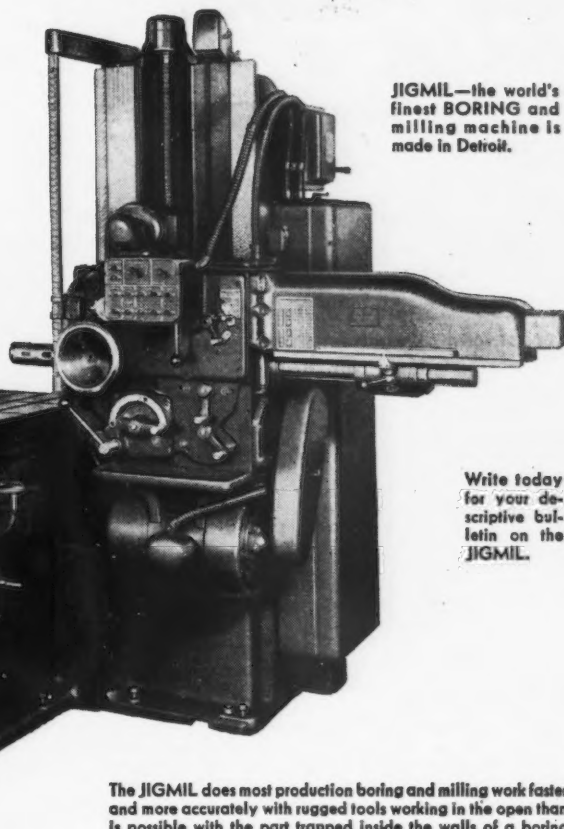


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**The JIGMIL has proven
to be a totally new ap-
proach to the problems
of economical precision
BORING and milling . . .**

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"TWO TO THREE TIMES the production and higher quality work" is what users are saying about the 3-B DeVlieg JIGMIL—and here are the reasons why the results are better: 1. Automatic positioning of spindle from one location to another in response to measuring rods and push buttons to within less than .0001 (one ten-thousandth part of an inch). 2. Feather touch, pressure controlled slide locks that positively control locking uniformity, so essential to high precision work. 3. Unique operation and controls that make possible high precision work with relatively little skill.



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milling machine is
made in Detroit.

Write today
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The JIGMIL does most production boring and milling work faster and more accurately with rugged tools working in the open than is possible with the part trapped inside the walls of a boring fixture.

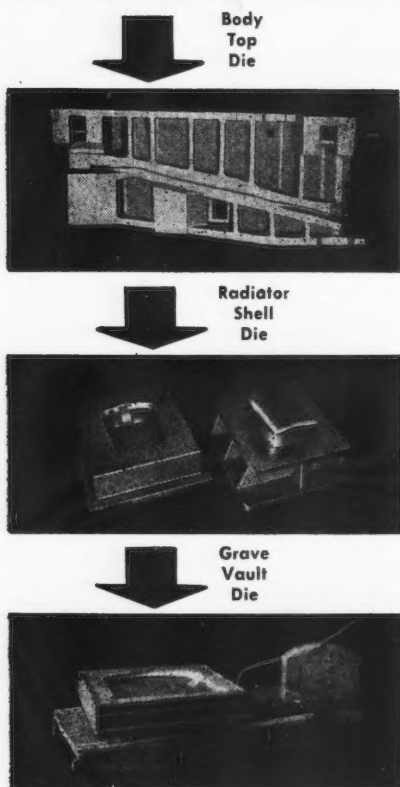
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YOUR
WORK**

DeVLIEG MACHINE COMPANY

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SCORES OF OUR LEADING INDUSTRIES USE STRENES



Because Strenes Metal can be cast to shape—because it usually saves about one-half on machining time—because its self-lubricating properties make for long runs and infrequent redressings—

Because of these and still other advantages, most of our automotive firms, stove manufacturers, refrigerator builders and many more specify Strenes regularly for drawing and forming dies.

Get the facts. They should convince you. Write.

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METAL**

NEWS OF INDUSTRY

Can Committee Finds Allotment Inadequate Washington

• • • The can manufacturing industry has been allocated 591,500 tons of prime tin plate and 15,000 tons of rejects for the second quarter by the WPB Requirements Committee instead of more than 700,000 tons of prime plates which it had requested.

The industry, through its Can Manufacturers Industry Advisory Committee at a recent meeting, told WPB Containers' Division representatives that the allocation would not be sufficient for the manufacture of new cans permitted by amendment of M-81 dated Jan. 1. It was also pointed out that the steel supply might be insufficient for the manufacture of some other cans for military and essential food requirements.

Committee members said further that the armed services are specifying sanitary-type cans for the packing of a number of food items not previously packed in this type of can. These items include coffee, spices, lards, and cereals. Because of the resultant burden on the facilities of large manufacturers equipped to produce sanitary cans, a WPB announcement said, some members suggested that it might be desirable to have the armed services change these specifications to permit packing these food items in types of cans that smaller manufacturers are equipped to make.

Rheem's Order Backlog Exceeds \$90 Million

New York

• • • Rheem Mfg. Co.'s unfilled order backlog on March 1 of this year amounted to more than \$90,000,000, according to R. S. Rheem, president. Net sales of the company in 1944 reached an all-time high of \$74,646,412, an increase of 36 per cent over 1943.

In 1944 the company's ordnance and aircraft products accounted for \$54,413,207 of total sales, while shipping containers, water heaters, boilers, tanks, etc., represented \$20,233,205 of the total.

Net earnings for 1944 were \$1,368,354 or \$1.85 per share of common, compared with a net income of \$1,310,836 or \$1.82 a share for 1943.

Renegotiation of government business has been completed for 1942 and 1943, and according to Mr. Rheem the company's net earnings were not found to be excessive.

STOP RUST

**Before
Painting**

**By Using
OAKITE
CrysCoat
Trade Mark U. S. Pat. Off.
No. 86**

By imparting a microscopic protective coating to steel and iron parts, OAKITE CrysCoat No. 86 inhibits rust on surfaces of work being held for paint or other organic finishes.

Not only does this revolutionary development impart a special RUST-RESISTING quality to steel and iron surfaces . . . it also provides effective removal of light oil, grease and shop dirt. Moreover, this three-in-one special surface conditioning treatment assures better grippage and tenacious adhesion of paint, lacquer and varnish.

Service Report FREE!

Oakite CrysCoat No. 86 offers many other advantages. Primarily designed for use in automatic washing machines, it is entirely SAFE to equipment surfaces. The low concentrations used make it extremely economical. Send TODAY for FREE Service Report giving complete details!

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OAKITE *Specialized cleaning*
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

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STEEL**

**COLD FINISHED
BESSEMER
SCREW STOCK**

*Uniform Bessemer Flame Control free
cutting steel for superior parts.*

*Our metallurgical engineers will be glad to
discuss your production problems with you.*

**JONES & LAUGHLIN STEEL
CORPORATION**

PITTSBURGH 30, PENNSYLVANIA

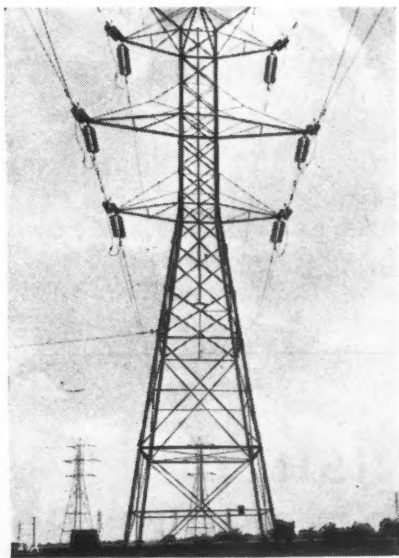
Whips Obstacle In Welding Galvanized

By GEORGE H. OHMER

Chief Engineer

Dayton

Product design engineers working with galvanized sheet, plate and pipe are planning the postwar use of welded fabrication for products heretofore of riveted or bolted construction. Such all-welded design has been made practical by the patented Galv-Weld Process, which, in brief, consists of the coating of the weld and the adjacent damaged area with Galv-Weld Alloy at the time of electric arc welding, making use of the residual heat to melt on flow on the alloy.



ALL WELDED TRANSMISSION TOWERS have been made possible by the Galv-Weld Process. Welded joints are regalvanized with Galv-Weld Alloy and permanently protected against rust.

The welded seams are stronger and provide a leak-proof and vibrationless construction, while the Galv-Weld Alloy coating insures protection against rust and corrosion equal to and/or better than the original hot dip galvanizing.

Regalvanizing with Galv-Weld Alloy is permanent; once applied the coating will not chip, peel or crack even when the base metal is stressed beyond its elastic limit. A comparison of Galv-Weld coatings with zinc sprayed coatings has conclusively proven that Galv-Weld is superior in all ways. It has a better bond, it will resist corrosion longer, it does not require sand or grit blasting, nor any special or expensive equipment for application.

Manufacturers are invited to submit samples of products for producing examples of how they can be Galv-welded. There is no cost for this demonstration. Details may be secured from Galv-Weld Products, Dayton 10, Ohio.

"Popping" Plants Are Created for Handling Used Cartridge Cases

Washington

The "Popping" Plant at Blue Grass Ordnance Depot, Richmond, Ky., is one of five such plants in the United States where fired cartridge cases of all sizes are salvaged.

"Popping" plants, so-called because of the noise made by the explosions or unburned powder, are a comparatively new industry. During the first World War, a very small number of cartridge cases were salvaged and the few that were salvaged were "popped" or cleaned by hand. Today the Popping Plant at Blue Grass handles millions of pounds of fired shells which are shipped in from theatres of war; posts, camps and stations where they were used for target practice; and defective shells from manufacturing plants.

The shells, which are shipped in boxes, are unpacked and dumped into hoppers which feed them to the conveyors to the furnace. It takes about 4 min. to "pop" the shells in the furnaces where the temperature is 1400 deg. The cases come out of the furnaces cleaned of all powder left in the primer and all sand and dirt. The conveyor carrying the shells from the furnace to the loading platform, allows them to cool before loading. The carloads of cases are then sent to buyers who reprocess the metal and some to the United States Mint where they are being made into coins.

The "Popping" Plant at Blue Grass operates two furnaces for three 8-hr. shifts a day, with an average of 86,-

000 lb. of salvaged metal processed each 8-hr. shift.

Not only is the plant a paying business, for the salvaged metal sells for approximately \$1,000,000 each month, but it supplies manufacturers much needed metal for remanufacture.

Other plants are located at Raritan Arsenal, Metuchen, N. J.; Savannah Ordnance Depot, Savannah, Ill.; Tooele Ordnance Depot, Tooele, Utah, and Seneca Ordnance Depot, Romulus, N. Y.

Civil Service Agency Needs Metallurgists

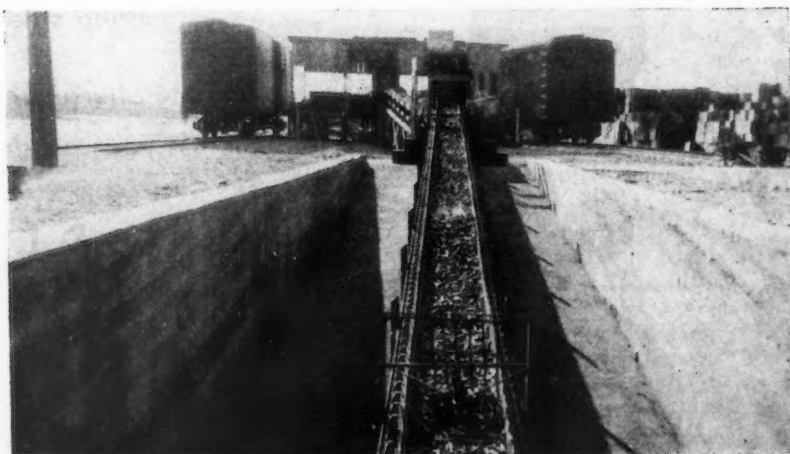
Washington

The Civil Service Commission has announced that metallurgists are needed at this time to fill positions in the Bureau of Mines, in Naval Shore Establishments, and in War Department Arsenals. The salaries, including overtime pay, range from \$2433 to \$6228 a year. Most of the positions are at the lower salary levels.

Applicants for the \$2433 positions must have had 3 years of technical experience in the field of metallurgy unless they can substitute appropriate education. The higher-grade positions require additional experience. No written test will be given and there are no age limits.

Interested persons may secure announcements containing full information regarding the positions, and application forms, at the nearest first or second-class post office or direct from the United States Civil Service Commission, Washington 25, D. C.

POPPING CONVEYOR: Mechanical handling is used to return empty cartridge cases to Army's several "popping" plants. Conveyors lead from the unloading platform to the furnaces.



Here's how POWER INDUSTRIAL TRUCKS

Conserve manpower—Reduce manufacturing cost

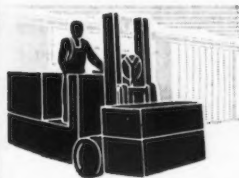
In your search for ways of conserving man hours and reducing cost, it will pay you to carefully scrutinize your handling methods. Investigation has shown that materials handling frequently accounts for 50 to 60% of production time. Listed below are a few of the many ways industrial trucks can help you reduce this percentage importantly.

Conserve Manpower:

One industrial truck can do the work of 5 to 7 men . . . quicker, safer and with minimum re-handling.



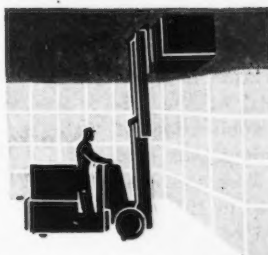
Faster Loading and Unloading of Cars:



By handling your materials in unit loads, industrial trucks can load or unload cars and trucks in a fraction of the time required by manual handling.

Greater Utilization of Storage:

With industrial trucks you stack to ceiling heights . . . doubling storage area without increasing floor space. Taking of inventory is simplified, and damage from vermin minimized.



Low Cost Handling in Process:

Materials are transported right to the worker's machine—finished materials transported to storage. The whole cycle completed with minimum re-handling.



Greater Safety:

to men and materials. Reduces product damage to the minimum.



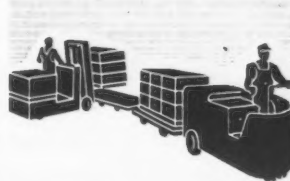
Miscellaneous Handling:

You'll find many additional cost-saving uses for your trucks—delivery of tools to workers . . . transporting dies and moulds to and from machines . . . scrap disposal, etc.

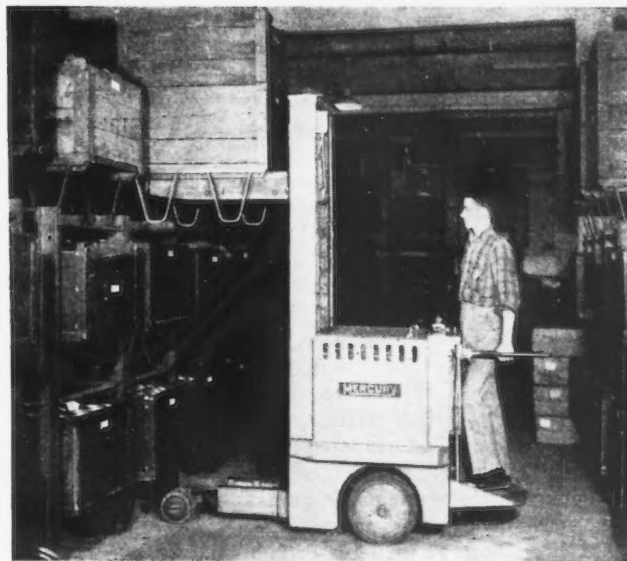


And if You Are Moving Materials 200 Feet or More . . .

you can realize additional saving with the Fork Truck—"Trackless Train" System. In the system the fork truck is used for handling and stacking, "The Trackless Train" for the transporting job. A further saving in manpower—time—and equipment.



For complete details ask a Mercury Engineer to call—or write for Bulletin 7-II.



THE MERCURY MANUFACTURING CO.

4144 SOUTH HALSTED STREET
CHICAGO 9, ILLINOIS



MERCURY

TRACTORS · TRAILERS · LIFT TRUCKS

MACHINE TOOLS

... News and Market Activities

Government Surplus Sales At Good Prices as Long as Contracts Last

Cleveland

• • • During the month of January and part of February, sales of metal working machinery including machine tools and machine parts, by the Reconstruction Finance Corp., operating under the Surplus Property Board, totaled \$2,285,000, or 54 per cent of their cost.

And as of Jan. 31, the inventory of metal working machinery was \$64,704,000, including mechanical presses, lathes, heat treating furnaces, boring, grinding, drilling, and milling machines. And up to Feb. 15, the RFC had acquired 19,210 surplus machine tools, sold 6771 for \$22,826,000, or 71 per cent of cost.

As these figures would indicate, we are still in the incipient stages of surplus disposal, which at this time is only a minor problem compared to the proportions it will probably reach later on. Furthermore, these figures show that the government isn't doing badly at all. Discounts go all the way up to 55 per cent, which leaves 45 per cent on, and the average was 54 per cent. Sales, of course, were to war contractors only and were not opened up to anyone else, which is understandable in view of the critical programs the government is most anxious to get going, and all this used machinery is being allocated accordingly.

Some machine tool builders here have voiced the opinion, perhaps unjustly, that Congress is afraid somebody is going to make some money. To resell anything through the original manufacturer, whether it be machine tools or anything else, may easily get the seller into trouble with the Department of Justice, whose business it is to watch for things like second profits. Unfortunately, this objection might be sufficiently valid in some cases to warrant the accusation, since Congress is prone to feel that channeling through original sources results in a second profit.

Disposal through original channels proved to be good for cutting tools and there is always the chance that it might work with machine tools. But if manufacturers get the chance

to do this, they must setup a separate department.

Naturally, the used machinery dealer would like to get in on this surplus disposal problem. It is his job, after all, to handle used machinery. He does not rebuild, but he does find machines and get them into use. There are ways of controlling his margin of profit. For example, the government could say, "we will sell surplus machine tools only to those who say their margin will be only 15 per cent," and that stipulation will be passed on to each new owner. This, in the opinion of some, may become an eventuality.

Machine tool builders stand for a

Decision Signifies Final Cleanup Of Machine Tool Suit

Detroit

• • • Final cleanup of the lengthy and significant patent suit over hydraulic machine tool controls, brought by W. F. and John Barnes Co., Rockford, Ill., against Ex-Cell-O Corp. here was signified in a recent supreme court decision denying a Barnes Co. petition to reopen the issue of costs in the case. The refusal of the tribunal to consider the application of costs against the defendant was said by attorneys to finally close the door on the suit, which started in 1936 and produced a court record of 3,500,000 words.

Phil Huber, president of Ex-Cell-O, said that an unsuccessful defense of the issue would have given the Rockford firm a virtual monopoly in the machine tool industry which would have affected practically all manufacturers, and would likewise have involved users.

Under the decision, machine tool builders are free to use a variety of basic principles utilized in hydraulic controls, including unitary construction of hydraulic valves for stopping, starting, reversing and controlling speed of machine tool systems; use of

quick turnover of the surplus and on a big scale and their thinking along disposal lines can be summed up something like this: "Do it quick—these things will be ruined—make plans now—move them fast." But the used machinery dealer, on the other hand, would be quite willing to see these sales, or the disposal, spread out over an extended period of time.

This situation may easily coalesce with German collapse and it is not unlikely that it will stay in a state of inactive flux until the Surplus Property Board calls up a Congressman or two and announces that all the warehouses are packed, and the stuff is coming in by the carload. Then there will be Congressional action. Until that time, when the problem will really exist, it is unlikely that we will have any constructive policy.

spring loaded working pressure relief valves for diverting or bypassing part of the fluid supplied by a hydraulic pump when operation of the actuator at reduced speed is desired; spindle positioning through electric plugging; and straight line indexing with hydraulic actuation and interlocking controls.

The case went to the Supreme Court after a federal court decision in Chicago almost two years ago (THE IRON AGE—July 1, 1943, p. 150) favored the defendants.

Markets Return to Normalcy Cincinnati

• • • Return of the Ohio River to its banks recently, following a near record flood, brought return of war normalcy to the district market. Few plants were directly affected by the floods, but all were indirectly. Absenteeism soared because men could not get to plants and transportation of materials was also cramped by the swollen river. New business continues in good volume and plants report backlogs are now extending into the second half. Production during the flood also was handicapped and this added further to the backlog. Production is now up to the present plant capacities and within the available labor supply.

activities

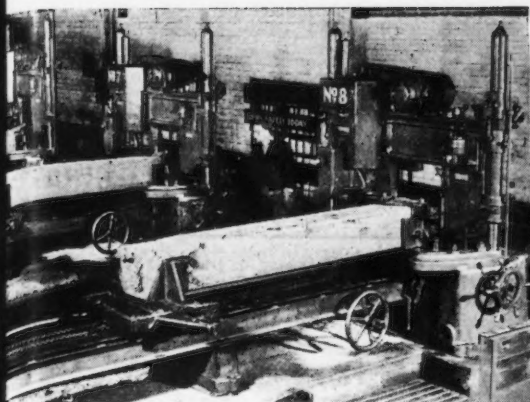
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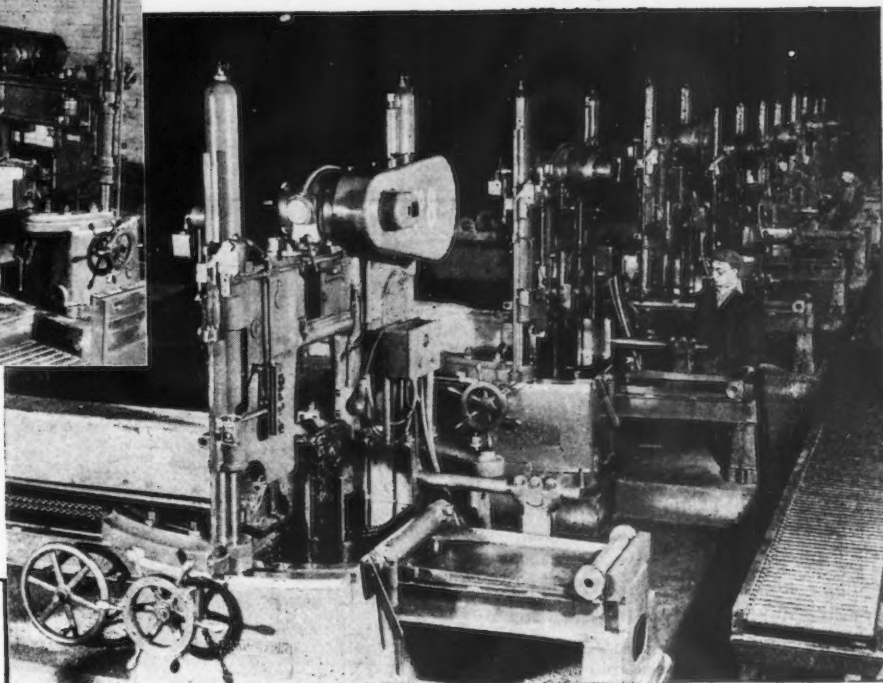
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Part of the row of No. 18 MARVEL Giant Hydraulic Hack Saws used to crop and cut-off test slices for metallurgical test for large billets of tough alloy steels.



MARVEL No. 18 Hydraulics 12 in a Row!

When a greatly expanded steel plant, near Canton, Ohio faced the problem of cropping and cutting-off test samples from large alloy billets, in *wartime* quantities and at wartime speed, they checked the performance of all types of cutting-off equipment in all their other company plants, and selected MARVEL No. 18 Giant Hydraulic Hack Saws for this “tough” job.

Now this row of twelve MARVEL No. 18 Hydraulics shown above, operating continuously, 24 hours a day on tough alloy billets of from 14” to 16” cross section, handle this tremendous, heavy duty cutting-off job without a hitch and with a minimum of man hours—only four operators per shift.

When you have a cutting-off problem your most logical first step is to check with your local MARVEL Sawing Engineer for recommendations of methods and equipment.

ARMSTRONG-BLUM MFG. CO.

“The Hack Saw People”

5700 W. Bloomingdale Ave.

Chicago 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., N. Y. 12, N. Y.



NON-FERROUS METALS

... News and Market Activities

Wright Aluminum Scrap Recovery Mechanized

Wood-Ridge, N. J.

••• At the Wright Aeronautical Corp. plant here, the recovery of aluminum chips from a pair of Greenlee automatic transfer machines, drilling, milling and tapping forged aluminum heads for Cyclone engines, is handled on a mass production basis with Link-Belt equipment.

Chips flow from the machine through a flume leading to a vibrating fine mesh stainless steel screen which drains the oil into a tank below, discharging chips to an inclined conveyor. Chips are discharged into a 40 cu. ft. capacity bin fitted with undercut discharge gate that permits withdrawal into a trailer truck. The capacity of screen and conveyor is 40 cu. ft. of aluminum chips per hr.

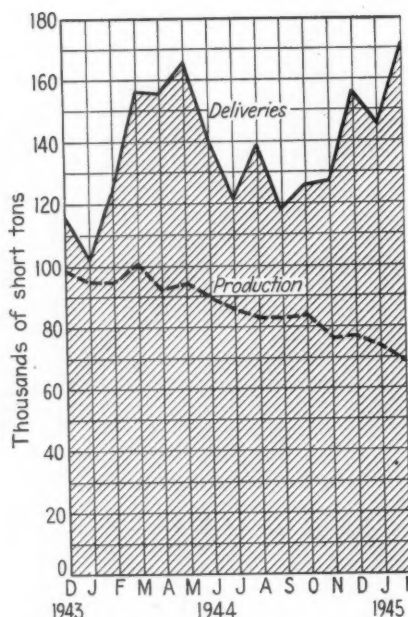
A semi-automatic skip hoist has a loading platform at the floor level just outside the building. The trailer truck, which weighs 1600 lb. when loaded, is clamped in position on the skip platform. The truck is elevated and when inverted discharges chips into a waiting motor truck and is returned empty to foot of elevator. Chips are trucked to the Federated Metals Division of American Smelting and Refining Co. at Perth Amboy, N. J., for remelting.

WPB Increases Lead For Civilian Uses

Washington

••• In order to bolster civil requirements, WPB has announced that 25,910 tons of lead would be "tentatively" allocated from the nation's stockpile for the second quarter. This, it was said, would increase amounts of lead previously allocated for civilian batteries by 14,000 tons, while lead for cable coverings would be boosted 6300 tons, tetraethyl lead, 4500 tons, and collapsible tubes 1100 tons.

However, the Requirements Committee has definitely authorized increased allocations only for April, WPB emphasized. These definite authorizations include 4666 tons for batteries, 2100 tons for cable cover-



COPPER PICTURE: Although February deliveries to fabricators reported by the Copper Institute have reached a new peak at 172,585 short tons, unrefined copper production of 67,425 tons is a wartime low caused by transportation difficulties and labor shortage at the mines. Differences in tonnage between mine production and deliveries represents use of foreign copper by fabricators.

ing, 500 tons for tetraethyl lead and 370 for collapsible tubes. Definite authorizations for the balance of the second quarter will be considered at the next meeting of the Requirements Committee on Metals, around the middle of April. It is expected that the decrease in the lead stockpile will be offset by increased production through channeling additional manpower to the primary and secondary lead smelters, WPB spokesmen reported.

Lead Order Revision Expected

New York

••• Trade sources report that the Tin, Lead and Zinc Division of WPB will issue a revision of the lead order in about a week. The revision is expected to define and expand the section of the order dealing with permissible uses of lead.

Lead supplies continue tight.

Miniature Lead-Acid Battery Developed

New York

••• A miniature lead-acid storage battery containing 18 cells and weighing only six ounces has been developed by the Willard Storage Battery Co., Cleveland, according to Lead, the publication of the Lead Industries Assoc. These batteries, said to be the smallest high voltage storage batteries commercially built, are used to power balloon-borne automatic radio transmitters sending out temperature, pressure and humidity data for meteorological use. Three batteries are required to furnish the plate current, and a 3-cell battery of about the same size provides filament current. Plastic cases are used and a special absorptive material for separators. There is said to be positive spill-proof protection for the electrolyte.

The battery can be stored dry until required for use, when it is filled with electrolyte. Their small size would present quite a problem in filling all 18 cell openings per battery which would have to be done with a hypodermic syringe. Therefore an ingenious method of filling has been developed. A complete set of batteries for one observation flight is placed under high vacuum in a lead coated metal container, which also acts as the shipping case.

Lower Antimony Exemption

Washington

••• Slashing its small-order exemption 90 per cent because of increasing war needs, WPB has amended M-112 to permit consumers to purchase only 224 lb. of antimony monthly instead of 2240, previously allowed.

Aluminum Scrap Softer

New York

••• There is some softness in aluminum scrap this week which has not been reflected in a lower schedule of prices paid by ingot producers. The softness is due to tremendous quantities of aluminum scrap now entering the market as a result of the expanded aircraft program.

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	\$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	\$1.50 to \$1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.9%, dollars per troy oz.	\$4.00
Iridium, dollars per troy oz.	\$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	\$163.00 to \$168.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	\$24.00
Platinum, dollars per oz.	\$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing	
No. 2, 3, 4	\$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	20.37	
Copper, H.R.	17.37		
Copper drawn	18.37		
Low brass, 80%	20.40	20.15	
High brass		19.48	
Red brass, 85%		20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	15.01		
Commercial bronze, 90%		21.32	21.07
Commercial bronze, 95%		21.53	21.28
Manganese bronze	24.00		28.00
Phos. bronze, A, B, 5%		36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculey, Olympic or equal		25.50	26.00
Nickel silver, 5%		28.75	26.50
Architect bronze	19.12		

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)
 Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (1/2H); 52S, 61c. (O); 24S, 67 1/2c. (T).
 Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.
 Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28 1/2c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: 1/4 in., 28 1/2c. per lb.; 1/2 in., 26c.; 1 in., 24 1/2c.; 2 in., 23c. Hexagonals: 1/4 in., 34 1/2c. per lb.; 1/2 in., 28 1/2c.; 1 in., 25 1/2c.; 2 in., 25 1/2c. 2S, as fabricated, random or standard lengths, 1/4 in., 24c. per lb.; 1/2 in., 25c.; 1 in., 24c.; 2 in.,

23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27 1/2c.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.35*
Manganese bronze solids	6.25*
Manganese bronze borings	6.50*
Manganese bronze borings	5.50*

OPA Group 4†

Refinery brass	4.75*
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*Price varies with analysis. †Lead content 0.00 to 0.40 per cent. ‡Lead content 0.41 to 1.00 per cent.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated†

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	
25S	5.00
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S	
solids	7.50
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.50

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unswaged zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under 1/4%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25 1/2
Electrolytic, full size	22 1/2
cut to size	30 1/2
Rolled, oval, straight, 15 in. and longer	23 1/4
Curved	24 1/4
Brass Cast, 82-20, elliptical, 15 in. and longer	23 1/2
Zinc: Cast, 99.99, 16 in. and over	16 1/4
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00-13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82-41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc, cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 39% crystals, bbls.	6.80

SCRAP

... News and Market Activities

New \$2 Spread in Chicago Bundles

New York

••• There are no significant price changes reported from any district this week except from Chicago where for the first time a price differentiation of \$2 per ton has been established by one mill between No. 2 dealers' bundles and bundled machine shop turnings. While it is reported that other mills continue to accept the two grades at the same price, there is no ready definition of the significance of this move.

Most district comments are concerned this week as in the past with the problem of yard labor, one that seems to have no solution and may continue perhaps for the duration of the war. Mill inventories appear to be worsening, or at best holding their own, despite improved yard activities permitted by milder weather.

PITTSBURGH—Heavy scrap is still very scarce, in spite of the better weather conditions and also an improved car situation. Cast scrap is almost non-existent in the market. Turnings prices are stronger but not advanced this week, probably because greater quantities are being used in the open hearth as a result of the shortage of heavy scrap. The railroad lists this month show a greater quantity of scrap, generally, but this is mainly the result of bad weather the past two months which permitted very little or no scrap collections. However, the increased quantities offered by the railroads do not even make a dent in the market.

CHICAGO—Orders for approximately 10,000 tons of prime open hearth grades were placed last week by a major district consumer who returned to the market after a long period of inactivity. This order later was stretched by possibly another 10,000 tons when brokers were permitted to replace cancelled orders for bundled machine shop turnings with other grades. The fact that No. 2 dealers' bundles was included, and price differentiation made with bundled machine shop turnings establishes for the first time a price spread between these two grades. Other district mills continue to view these classifications as one. Orders for out of town shipment, which have supported the local market in recent weeks are slowing down. However, no definite price weakness has been established in secondary or blast furnace grades as a result.

DETROIT—Signs were apparent this week of latent strengthening of turnings grades, although the only concrete change occurred in reverse direction with elimi-

nation of the top of the abnormal spread in shoveling turnings prevailing the past few weeks. Movement in all grades, aided by the weather, is improving. Electric and open hearth scrap remain strong, and cast continues scarce.

BIRMINGHAM—Strong demand exists here for cast grades with some tonnages moving to northern markets. Supplies of open hearth grades are limited and only a moderate interest is being shown for blast furnace material with the exception of short shoveling turnings. Prices remain firm.

ST. LOUIS—A better demand for machine shop turnings has developed in other markets, giving a firmer tone to the item here, although prices are unchanged. Heavy grades of melting steel are especially tight, largely due to the shortage of men to handle the scrap all down the line.

BUFFALO—Demand for heavy steel scrap continues strong with furnace operations in the high register and no material increase in receipts under ideal weather conditions. Borings and turnings appear to have leveled off, at least for the time at \$1.25 under ceiling. Several thousand tons of machine scrap and short shoveling turnings have been purchased by a leading consumer at \$13 and \$15 respectively. Although cast iron scrap remains in scant supply, the WPB's 60-day limitation on stockpiles is reported permitting wider distribution among melters. Inquiry for low phosphorous items is good.

CLEVELAND—There have been no price changes here. Turnings are being shipped out of town and the opinion has been expressed in some quarters that weakness can be expected. Right now there is a market for every grade of scrap at some price and inventories are very low. While some of the mills are over the hump, WPB recently granted permission to one of the chief consumers in the Valley to use electric furnace scrap in their open hearth operations. Cast iron is particularly bad, and foundries are willing to pay almost any freight to get it here. With open hearth generally, the situation is such that material is moving into Ohio from points as far away as Florida. Turnings for shipment out of town are being sold for \$10.50.

BOSTON—WPB has allocated 1500 tons of cast floor plate from a dismantled Worcester plant to New England foundries. Brokers generally report cast a little more free, but the supply is by no means adequate to give all foundries more than a week's stockpile. An improvement is noted in shipments to eastern Pennsylvania, mostly borings, turnings and steel. Preparation of steel continues slow due to the shortage of labor.

Yards report considerable delay in getting weights of loaded cars back from the railroads. Just another worry for the trade.

NEW YORK—Movement of scrap continues to improve in this district under milder weather conditions but it is reported by dealers that mills are consuming shipments at an increasing rate so that mill stocks are not being built up. Certain dealers report that a better labor rating has been received from manpower authorities but that additional labor has not been found.

PHILADELPHIA—The scrap market here this week is unchanged. Shipments, however, are slightly improved although not sufficiently to cause any inventory increases. In some cases, in fact, inventories have decreased in spite of the somewhat greater influx of scrap. Turnings are readily absorbed and have thus far shown no weakening in price.

CINCINNATI—Dislocations resulting from the Ohio River flood last week are still sharply affecting the market. Flood waters held up transportation, cutting down the number of cars available for shipment, and entered a number of yards which are now digging out from the mud and filth. The labor situation continues to complicate the picture here although dealers indicate that mills are taking whatever they can send them, but the shortage of labor and yard conditions make it impossible completely to supply the small users. Some consumers are accepting shipments as small as truckloads to keep operating. This is particularly true of scarce items such as cast. Rails are also reported to be getting scarcer, but turnings continue to be a drug on the market.

Chilean Scrap Costly

New York

••• Scrap steel has been sold in Chile at a price of \$70 per ton, it was stated by G. S. Gildersleeve of Republic Steel Corp. to the Export Managers Club of New York recently after his return from a trip to South America. There was a great shortage of steel and machinery in all the countries visited, he told club members.

Battle Scrap Not Moving

Buffalo

••• It is reported that little of the battlefield tank scrap shipped to a local dealer some time ago has reached the mills yet due to a shortage of preparation labor.

IRON AND STEEL SCRAP PRICES

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	\$13.00 to 13.50
Short shov. turn.	15.50 to 16.00
Mixed bor. and turn.	13.00 to 13.50
Cast iron borings	14.50 to 15.00
Hvy. break. cast.	16.90*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Roller steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	\$18.25 to 18.75
Bundled mach. shop turn.	16.25 to 16.75
Galv. bundles	14.25 to 14.75
Mach. shop turn.	8.50 to 9.00
Short shovel. turn.	9.25 to 9.75
Cast iron borings	9.25 to 9.75
Mix. borings & turn.	9.25 to 9.75
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Angles & splice bars	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	22.75 to 23.25
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	\$8.00 to 8.50
Shoveling turn.	9.00 to 9.50
Cast iron borings	8.50 to 9.00
Mixed bor. & turn.	8.00 to 8.50
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Stove plate	19.00*
Scrap rails	21.50*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	\$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shoveling	\$11.00 to 11.06
Machine shop turn.	9.00 to 9.06
Mixed bor. & turn.	9.00 to 9.06
Cl'n cast, chem. bor.	13.06 to 14.15*
Truck delivery to foundry	
Machinery cast	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	\$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	\$9.00 to 9.50
Short shov. turn.	10.50 to 11.00
Cast iron borings	9.75 to 10.25
Mixed bor. & turn.	9.00 to 9.50
Low phos. plate	19.82*
No. 1 cupola cast.	20.00*
Charging box cast.	18.00 to 19.00
Hvy. breakable cast	16.50*
Stove plate	18.50 to 19.00
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	14.75*
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box.	19.00*
Hvy. axle, forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	\$17.50*
Bundled sheets	17.50*
Mach. shop turn.	\$7.00 to 7.50
Hvy. axle turn.	15.50 to 16.00
Locomotive tires, uncut.	20.00*
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	23.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.90*
Cast iron carwheels	18.50*
No. 1 mach'ry cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	\$9.50 to 10.00
Cast iron borings	9.50 to 10.00
Bar crops and plate	19.50*
Structural and plate	19.50*
No. 1 cast	20.00*
Stove plate	17.00*
Steel axles	18.00*
Scrap rails	18.50*
Rerolling rails	20.50*
Angles & splice bars	20.50*
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	\$13.00 to 13.50
Short shovel. turn.	15.00 to 15.50
Cast iron borings	14.00 to 14.50

NEW YORK

Dealers' buying prices per gross ton, on cars

No. 1 hvy. melting	\$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Charging box cast.	19.00*
Stove plate	19.00*
Clean auto cast.	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	13.00
Shoveling turn.	15.00
Cast iron borings	14.00
Mixed bor. & turn.	13.00
No. 1 cupola cast.	20.00*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	22.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet 'stl.	19.50*
Drop forge flashings	19.00*
No. 2 bundles	19.00*
Mach. shop turn.	\$12.50 to 13.00
Short shovel.	14.50 to 15.00
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	13.50 to 14.00
Mixed bor. & turn.	12.50 to 13.00
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	\$15.50 to \$16.25
No. 1 hvy. melting	15.50 to 16.25
No. 2 hvy. melting	14.50 to 15.25
No. 2 bales	13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$14.50 to \$15.50
No. 2 hvy. melting	13.50 to 14.50
No. 2 bales	12.50 to 13.50
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	\$13.50
No. 1 hvy. melting	13.50
No. 3 bundles	11.50
Elec. furn. 1 ft. und.	\$16.00 to 17.00
No. 1 cupola cast	20.00*

Comparison of Prices . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. Prices are F.O.B. Major Basing Points. The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 134-144.

Flat Rolled Steel:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Cents Per Lb.)	1945	1945	1945	1944
Hot rolled sheets.....	2.20	2.20	2.10	2.10
Cold rolled sheets.....	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.65	3.65	3.50	3.50
Hot rolled strip.....	2.10	2.10	2.10	2.10
Cold rolled strip.....	2.80	2.80	2.80	2.80
Plates.....	2.20	2.20	2.10	2.10
Plates, wrought iron.....	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Dollars Per Base Box)				
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic....	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Cents Per Lb.)				
Merchant bars.....	2.15	2.15	2.15	2.15
Cold finished bars.....	2.65	2.65	2.65	2.65
Alloy bars.....	2.70	2.70	2.70	2.70
Structural shapes.....	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars.....	4.40	4.40	4.40	4.40

Wire and Wire Products:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Cents Per Lb.)				
Plain wire.....	2.60	2.60	2.60	2.60
Wire nails.....	2.80	2.80	2.55	2.55

Rails:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Dollars Per Gross Ton)				
Heavy rails.....	\$43.00	\$43.00	\$40.00	\$40.00
Light rails.....	43.00	43.00	40.00	40.00

Semi-Finished Steel:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Dollars Per Gross Ton)				
Rerolling billets.....	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars.....	34.00	34.00	34.00	34.00
Slabs, rerolling.....	34.00	34.00	34.00	34.00
Forging billets.....	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Cents Per Lb.)				
Wire rods.....	2.00	2.00	2.00	2.00
Skelp.....	1.90	1.90	1.90	1.90

Latest steel interim price increase authorized by OPA effective Jan. 11, 1945.

Pig Iron:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Per Gross Ton)				
No. 2 fdy., Philadelphia..	\$26.84	\$26.84	\$25.84	\$25.84
No. 2, Valley furnace....	25.00	25.00	24.00	24.00
No. 2, Southern Cin'ti....	26.11	26.11	25.11	23.94
No. 2, Birmingham.....	21.38	21.38	20.38	20.38
No. 2, foundry, Chicago†.	25.00	25.00	24.00	24.00
Basic, del'd eastern Pa...	26.34	26.34	25.34	25.34
Basic, Valley furnace....	24.50	24.50	23.50	23.50
Malleable, Chicago†....	25.00	25.00	24.00	24.00
Malleable, Valley.....	25.00	25.00	24.00	24.00
L. S. charcoal, Chicago..	37.34	37.34	37.34	37.34
Ferromanganese†.....	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡ For carlots at seaboard.

Last pig iron price change authorized by OPA effective Feb. 14, 1945.

Scrap:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Per Gross Ton)				
Heavy melt'g steel, P'gh.	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh...	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia.	20.00	20.00	20.00	20.00
No. 1 cast, Chicago.....	20.00	20.00	20.00	20.00

Coke, Connellsville:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Per Net Ton at Oven)				
Furnace coke, prompt...	\$7.00	\$7.00	\$7.00	\$7.00
Foundry coke, prompt...	8.25	8.25	8.25	8.25

Non-Ferrous Metals:	Mar. 20, 1945	Mar. 13, 1945	Feb. 13, 1945	Mar. 21, 1944
(Cents Per Lb. to Large Buyers)				
Copper, electro., Conn....	12.00	12.00	12.00	12.00
Copper, Lake.....	12.00	12.00	12.00	12.00
Tin (Straits), New York.	52.00	52.00	52.00	52.00
Zinc, East St. Louis.....	8.25	8.25	8.25	8.25
Lead, St. Louis.....	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd..	15.00	15.00	15.00	15.00
Nickel, electrolytic.....	35.00	35.00	35.00	35.00
Magnesium, ingot.....	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex...	14.50	14.50	14.50	14.50

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

FINISHED STEEL	
March 20, 1945.....	2.25839c. a Lb.....
One week ago.....	2.25839c. a Lb.....
One month ago.....	2.25839c. a Lb.....
One year ago.....	2.27235c. a Lb.....

HIGH		LOW	
1945.....	2.25839c., Jan. 16	2.21189c., Jan. 2	
1944.....	2.30837c., Sept. 5	2.21189c., Oct. 5	
1943.....	2.25513c.	2.25513c.	
1942.....	2.26190c.	2.26190c.	
1941.....	2.43078c.	2.43078c.	
1940.....	2.30467c., Jan. 2	2.24107c., Apr. 16	
1939.....	2.35367c., Jan. 3	2.26689c., May 16	
1938.....	2.58414c., Jan. 4	2.27207c., Oct. 18	
1937.....	2.58414c., Mar. 9	2.32263c., Jan. 4	
1936.....	2.32263c., Dec. 28	2.05200c., Mar. 10	
1935.....	2.07642c., Oct. 1	2.06492c., Jan. 8	
1934.....	2.15367c., Apr. 24	1.95757c., Jan. 2	
1933.....	1.95578c., Oct. 3	1.75836c., May 2	
1932.....	1.89196c., July 5	1.83901c., Mar. 1	
1931.....	1.99626c., Jan. 13	1.86586c., Dec. 29	
1930.....	2.25488c., Jan. 7	1.97319c., Dec. 9	
1929.....	2.31773c., May 28	2.26498c., Oct. 29	

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

PIG IRON			
.....	\$24.61 a	Gross Ton.....	
.....	\$24.61 a	Gross Ton.....	
.....	\$23.61 a	Gross Ton.....	
.....	\$23.61 a	Gross Ton.....	
HIGH		LOW	
\$24.61, Feb. 20	\$23.61	\$23.61, Jan. 2	
	23.61	23.61	
	23.61	23.61	
\$23.61, Mar. 20		\$23.45, Jan. 2	
23.45, Dec. 23		22.61, Jan. 2	
22.61, Sept. 19		20.61, Sept. 12	
23.25, June 21		19.61, July 6	
23.25, Mar. 9		20.25, Feb. 16	
19.74, Nov. 24		18.73, Aug. 11	
18.84, Nov. 5		17.83, May 14	
17.90, May 1		16.90, Jan. 27	
16.90, Dec. 5		13.56, Jan. 3	
14.81, Jan. 5		13.56, Dec. 6	
15.90, Jan. 6		14.79, Dec. 15	
18.21, Jan. 7		15.90, Dec. 16	
18.71, May 14		18.21, Dec. 17	

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

SCRAP STEEL			
.....	\$19.17	a Gross Ton.....	
.....	\$19.17	a Gross Ton.....	
.....	\$19.17	a Gross Ton.....	
.....	\$19.17	a Gross Ton.....	
HIGH		LOW	
\$19.17		\$19.17	
19.17		\$15.67, Oct.	24
19.17*		19.17	
19.17		19.17	
\$22.00, Jan.	7	\$19.17, Apr.	10
21.83, Dec.	30	16.04, Apr.	9
22.50, Oct.	3	14.08, May	16
15.00, Nov.	22	11.00, June	7
21.92, Mar.	30	12.67, June	8
17.75, Dec.	21	12.67, June	9
13.42, Dec.	10	10.33, Apr.	29
13.00, Mar.	13	9.50, Sept.	25
12.25, Aug.	8	6.75, Jan.	3
8.50, Jan.	12	6.43, July	5
11.33, Jan.	6	8.50, Dec.	29
15.00, Feb.	18	11.25, Dec.	9
17.58, Jan.	29	14.08, Dec.	3

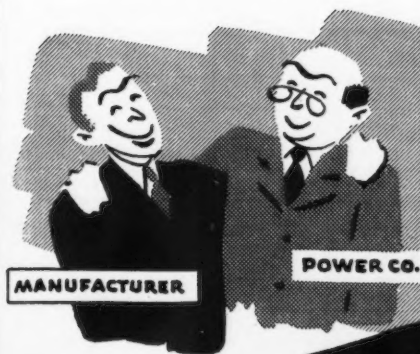
Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

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NOW... RESISTANCE WELDING AT

Near Unity Power Factor (less KVA)



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"THREE-PHASE"

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Manufacturers and power companies have long been at odds over the problem of supplying power for heavy reactive loads. Particularly in the case of heavy duty resistance welding of steel, power suppliers have often found it necessary to place a **demand charge** on the manufacturer.

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One reason for this is that conventional welders must utilize the comparatively high frequency alternating current in their secondary circuit. High frequencies mean high reactance, with resultant operation at very low power factor — often 25% or less. Low power factor means more current must be available to meet the same demand . . . often requiring a boost in the size of distribution facilities.

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Sciaky "THREE-PHASE" welders are designed to overcome this, as well as other difficulties encountered in heavy duty resistance welding. An ideal low frequency current is produced at the electrode tips by an ingenious system of first, rectifying all three phases of the supply to d.c., then reconverting to an alternating impulse. Operation is on a **balanced three phase load at near unity power factor**.

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Bulletin 204-A describing fully the Sciaky "THREE-PHASE" principle will be gladly sent on request.

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SCI AKY BROS.

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Complete line of AC and DC Electric Resistance Welding Machines

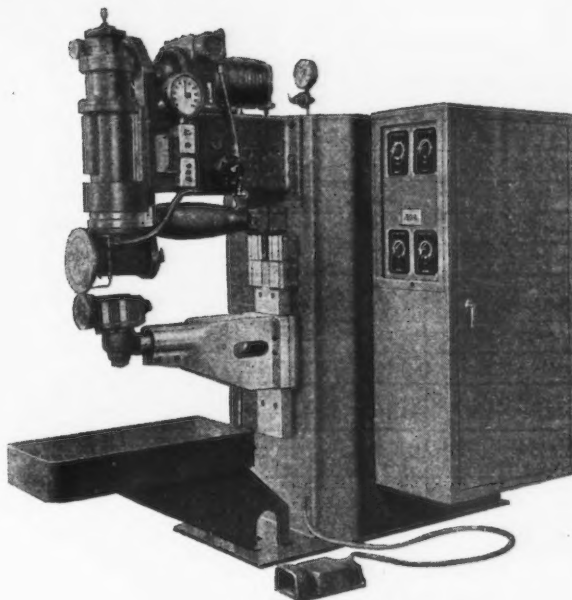
4915 West 67th Street, Chicago 38, Illinois

Offices in Detroit, Los Angeles, Washington, Cleveland and New York

Representatives in Principal Cities

In England: Sciaky Electric Welding Machines, Ltd., London

In France: Sciaky S.A., 13, 15 Rue Charles Fournier, Paris



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The Sciaky THREE-PHASE principle has been effectively applied to heavy gauge seam welding. The machine illustrated (type PMM.2T-13) welds steel up to two thicknesses of .109" and can achieve a speed of 84" per minute on two thicknesses of .040". Transformer rating is 120 KVA at 50% duty cycle. Unit is entirely self-contained with hinged side mounted rectifier and control cabinets. Electronic controls provide adjustable on-off time, squeeze and hold time.

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb. unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes, 25c. above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price for annealed, bright finish wires, commercial spring wire. (15) Deduct 10c. per 100 lb. for plates not produced to sheared mill or universal mill width and length tolerances.

Basing Point Product	DELIVERED TO														
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	Detroit	New York	Phila- delphia
SHEETS															
Hot rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.65¢	3.65¢	3.65¢		3.65¢	3.65¢	3.65¢	3.65¢	3.75¢	3.65¢		4.20¢		3.89¢	3.82¢
Enameling (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes ²	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢		(Worcester=3.00¢)				2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢		(Worcester=3.35¢)				3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.36¢	5.32¢
Electro, box	(0.25 lb. \$4.35 0.50 lb. \$4.50 0.75 lb. \$4.65)	\$4.35 \$4.50 \$4.65	\$4.35 \$4.50 \$4.65						\$4.60 \$4.75						
BLACK PLATE															
29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ¹³			3.37¢
TERNES, MFG.															
Special coated, base box	\$4.30	\$4.30	\$4.30						\$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth=2.25¢)		2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢ ¹³	2.25¢	2.39¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢ ¹³	2.25¢		2.47¢
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit=2.70¢)	(Toledo=2.80¢)			2.99¢	2.97¢	
Alloy, hot rolled	2.70¢	2.70¢				2.70¢			(Bethlehem, Massillon, Canton=2.70¢)				2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES															
Carbon steel ¹⁵	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢		2.20¢	2.20¢	(Coatesville and Claymont=2.20¢)	2.45¢	2.55¢	2.75¢	2.42¢	2.39¢	2.25¢
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢				(Coatesville=3.50¢)					3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem=2.10¢)		2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢					(Worcester=3.00¢)						
0.51 to 0.75 Carbon	4.30¢			4.30¢					(Worcester=4.50¢)						
0.76 to 1.00 Carbon	6.15¢			6.15¢					(Worcester=6.35¢)						
1.01 to 1.25 Carbon	8.35¢			8.35¢					(Worcester=8.55¢)						
WIRE ⁹															
Bright ¹⁴	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester=2.70¢)	(Duluth=2.65¢)		3.10¢			2.92¢
Galvanized															
Spring (High Carbon)	3.20¢	3.20¢		3.20¢					(Worcester=3.30¢)			3.70¢			3.52¢
PILING															
Steel Sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6.

Slabs, per gross ton—Andrews Steel Co. \$41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger \$37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. \$41; Phoenix Iron Co. (rerolling) \$41, (forging) \$47; Granite City Steel \$47.50; Kaiser Co. (rerolling) \$58.64, (forging) \$64.64, f.o.b. Los Angeles.

Blooms, per gross ton—Phoenix Iron Co. (rerolling) \$41; (forging) \$47; Pgh. Steel Co. (rerolling) \$38.25, (forging) \$44.25; Wheeling

Steel Corp. (rerolling) 4 in. sq. or larger \$37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) \$58.64, (forging) \$64.64, (shell steel) \$74.64 f.o.b. Los Angeles.

Sheet Bar, per gross ton—Empire Sheet & Tin Plate Co. \$39 mill; Wheeling Steel Corp. \$38 Portsmouth, Ohio.

Billets, Forging, per gross ton—Andrews Steel Co. \$50 basing pts.; Follansbee Steel Corp. \$49.50 Toronto, Ohio; Phoenix Iron Co. \$47 mill; Geneva Steel Co. \$64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. \$49.50; Kaiser

Co. \$64.64, (shell steel) \$74.64, f.o.b. Los Angeles.

Billets, Rerolling, per gross ton—Continental Steel Corp. may charge Acme Steel in Chicago switching area \$34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) \$41 mill; Wheeling Steel Corp. 4 in. sq. or larger \$37.75, smaller \$39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at \$39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. \$41 mill; Contin-

PRICES

tal Steel Corp. (1½ x 1½) \$39.50, (2 x 2) \$40.60 Kokomo, Ind. (these prices include \$1 size extra); Keystone Steel & Wire Co. \$36.40 Peoria; Connors Steel Co. \$50.60 Birmingham; Ford Motor Co. \$34 Dearborn, Mich.; Geneva Steel Co. \$58.64 f.o.b. Pacific Coast; Fgh. Steel Co. \$43.50; Kaiser Co. \$58.64 f.o.b. Los Angeles.

Structural Shapes—Phoenix Iron Co. 2.35c. basing pts. (export) 2.50c. Phoenixville; Knoxville Iron Co. 2.30c. basing points; Kaiser Co. 3.20c. f.o.b. Los Angeles.

Rails, per gross ton—Sweet Steel Co. (rail steel) \$50 mill; West Virginia Rail Co. (light-weight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., \$45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. 2.65c. mill; Knoxville Iron Co. 2.25c. basing pts.; Kaiser Co. and Geneva Steel Co. 3.20c. Pacific Ports; Central Iron and Steel Co. 2.50c. basing points; Granite City Steel Co. 2.35c. Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, 2.85c. mill; Eckels-Nye Steel Corp. 2.50c. basing pts. (rail steel) 2.40c.; Phoenix Iron Co. 2.40c. basing pts.; Sweet Steel Co. (rail steel) 2.35c. mill; Joslyn Mfg. & Supply Co., 2.35c. Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar), 2.35c. Chicago; Knoxville Iron Co., 2.30c. basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.; Milton Mfg. Co., 2.75c. f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel Corp., Benwood, 2.05c.

Reinforcing Bars—W. Ames & Co., 10 tons and over, 2.85c. mill; Sweet Steel Co. (rail steel), 2.35c. mill; Columbia Steel Co., 2.50c. Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New Engand Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants, f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co., for delivery except Texas and Okla., Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co., shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co., 2.30c. Chicago; Knoxville Iron Co., 2.25c. basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., 2.25c. Parkersburg.

Galvanized Sheets—Andrews Steel Co. 3.75c. basing pts.; Parkersburg Iron & Steel Co., 3.85c. Parkersburg; Apollo Steel Co., 3.75c. basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is 2.45c. per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

Wire Products—Pittsburgh Steel Co., f.o.b. Pittsburgh, per 100 lb., rods, No. 5 to 9/32 in., 2.20c.; rods, heavier than 9/32, 2.35c.; bright wire, 2.725c.; bright nails, 2.90c.; lead and furnace annealed wire, 2.85c.; pot annealed wire, 2.85c.; galvanized barbed wire, 3.90c.; plain staples, 2.55c.; galvanized staples, 2.65c.; bright spring wire, 3.30c.; galvanized spring wire, 3.45c.

R-S FURNACE DESIGN



QUALITY PRODUCTS
SINCE 1908

SAVES TONS OF STEEL

The specifications for three large Heat Treating Furnaces called for a considerable amount of steel. R-S Engineers altered the design of the furnaces which resulted in a saving of 15 tons of critical materials and a cash saving to the purchaser without any reduction in operating efficiency. Furthermore, the furnaces were placed in operation on essential war material at least six weeks ahead of the specified operating time.

Another R-S project demanded a unique design and novel material handling arrangement to heat treat steel castings for American tanks. It involved precise temperature control, as well as timing the speed of handling to coordinate all cycles of an intricate heat treating process. The desired ballistic and metallurgical properties were achieved with a minimum of manpower. Many steel foundry men consider this one of the most outstanding installations of its kind in the country. It has produced thousands of tons of vital war material on schedule.

You can depend on R-S Engineers to design a furnace skillfully so that the desired physical properties of the finished work will meet all requirements; to save critical materials and manpower wherever possible; to make delivery promptly.

If you have an industrial heat treating problem, write on your company letterhead for helpful suggestions.

R-S Furnaces of Distinction

FURNACE DIVISION

R-S PRODUCTS CORPORATION

4524 Germantown Avenue • Philadelphia 44, Pa.

BUY WAR BONDS

PRICES

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates 1/4 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 9442-45 Ann.	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 9442-45 Ann.	Cold Drawn, NE 9442-45 Ann.
Philadelphia	\$3.618	\$4.872 ^a	\$5.168 ^a	\$3.922	\$4.772	\$3.705	\$3.668	\$3.822	\$4.072	\$5.966	\$7.066	\$7.272	\$8.322
New York	3.690	4.813 ^a	5.160	3.974 ^a	4.772	3.888	3.758	3.853	4.103	6.008	7.108	7.303	8.383
Boston	3.944	4.744 ^a	5.374 ^a	4.108	4.715	4.012	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.494	4.852	5.044	3.902	4.752	3.894	3.799	3.802	4.052				
Norfolk	3.871	4.965	5.521	4.185	4.865	4.071	4.002	4.065	4.165				
Chicago	3.35	4.20	5.391	3.60	4.681 ⁷	3.65	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.487	4.337 ^a	5.422 ^a	3.737	4.787 ¹⁷	3.787	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.45	4.40	5.027 ^a	3.60	4.45	3.50	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.45	4.40	4.90 ^a	3.819	4.689	3.73	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.55	4.50	5.15 ^a	3.70	4.689 ¹⁷	3.709	3.681	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.525	4.475 ^a	4.975 ^a	3.675	4.711	3.711	3.691	3.811	4.011				
St. Louis	3.497	4.347 ^a	5.322 ^a	3.747	4.931 ¹⁷	3.797	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.45	4.40	4.90	3.60	4.45	3.50	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.61	4.48	5.407 ^a	3.86	4.351 ⁷	3.911 ³	3.811 ³	3.761 ³	4.361	6.09	7.19	7.681	8.711
Omaha	3.965	5.443	5.758 ^a	4.215		4.265	4.165	4.115	4.43				
Indianapolis	3.68	3.58	4.718	4.918	3.768	4.88	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.55		4.90	3.70		3.65	3.55	3.50	4.43				
Memphis	4.065 ⁷	4.66	3.415	4.215		4.165	4.065	4.015	4.33				
New Orleans	4.158 ^a	4.95	5.508	4.308		4.258	4.158 ^a	4.108 ^a	4.629				
Houston	3.863	5.573	6.463 ¹	4.313		4.35	4.25	3.75	6.373 ^a	7.223	8.323	8.323	9.373
Los Angeles	5.10	7.20 ³	6.25 ^a	4.95	5.613 ¹⁴	5.05	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.651 ⁴	7.30 ⁴	6.50 ^a	4.501 ⁴	7.333 ¹⁷	4.751 ⁴	4.351 ⁴	4.151 ⁴	5.333	8.304	9.404	9.404	10.454
Seattle	4.751 ²	7.05 ⁴	6.10 ^a	4.251 ²		4.851 ²	4.451 ²	4.351 ²	5.783				
Portland	4.751 ¹	6.60 ⁴	5.90 ^a	4.751 ¹		4.851 ¹	4.451 ¹	4.451 ¹	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.631 ⁷		6.321 ⁸	5.531 ⁷		5.081 ⁷	4.981 ⁷	4.881 ⁷	5.90				

National Emergency Steels MILL EXTRAS

Designa- tion	Basic Open-Hearth		Electric Furnace		Designa- tion	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 9812	0.65 ^a	\$13.00	\$1.15	\$23.00	NE 9427	0.75 ^a	\$15.00	\$1.25	\$25.00
NE 9815	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00
NE 9817	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 9820	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 9822	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 9825	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00
NE 9827	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00
NE 9830	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00
NE 9832	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00
NE 9835	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00
NE 9837	0.65	13.00	1.15	23.00					
NE 9840	0.65	13.00	1.15	23.00	NE 9722	0.65	13.00	1.15	23.00
NE 9842	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 9845	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 9847	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
NE 9850	0.65	13.00	1.15	23.00	NE 9742	0.65	13.00	1.15	23.00
					NE 9745	0.65	13.00	1.15	23.00
NE 9712	0.70	14.00	1.20	24.00	NE 9747	0.65	13.00	1.15	23.00
NE 9715	0.70	14.00	1.20	24.00	NE 9750	0.65	13.00	1.15	23.00
NE 9717	0.70	14.00	1.20	24.00	NE 9753	0.65	13.00	1.15	23.00
NE 9720	0.70	14.00	1.20	24.00	NE 9758	0.65	13.00	1.15	23.00
NE 9722	0.70	14.00	1.20	24.00					
NE 9725	0.70	14.00	1.20	24.00	NE 9830	1.30	26.00	1.80	36.00
NE 9727	0.70	14.00	1.20	24.00	NE 9832	1.30	26.00	1.80	36.00
NE 9730	0.70	14.00	1.20	24.00	NE 9835	1.30	26.00	1.80	36.00
NE 9732	0.70	14.00	1.20	24.00	NE 9837	1.30	26.00	1.80	36.00
NE 9735	0.70	14.00	1.20	24.00	NE 9840	1.30	26.00	1.80	36.00
NE 9737	0.70	14.00	1.20	24.00	NE 9842	1.30	26.00	1.80	36.00
NE 9740	0.70	14.00	1.20	24.00	NE 9845	1.30	26.00	1.80	36.00
NE 9742	0.70	14.00	1.20	24.00	NE 9847	1.30	26.00	1.80	36.00
NE 9745	0.70	14.00	1.20	24.00	NE 9850	1.30	26.00	1.80	36.00
NE 9747	0.70	14.00	1.20	24.00					
NE 9750	0.70	14.00	1.20	24.00	NE 9912	1.20	24.00	1.55	31.00
					NE 9915	1.20	24.00	1.55	31.00
NE 9415	0.75	15.00	1.25	25.00	NE 9917	1.20	24.00	1.55	31.00
NE 9417	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.55	31.00
NE 9420	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.55	31.00
NE 9422	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.55	31.00
NE 9425	0.75	15.00	1.25	25.00					

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. Note 2: For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, AISI Steel Products Manual. Note 3: When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and \$5 per gross ton for billets, blooms and slabs. Note 4: The extras shown are in addition to the base price of \$2.70 for 100 lb. on finished products and \$54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(*) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports*)

Per Gross Ton
Old range, bessemer, 51.50 \$4.75
Old range, non-bessemer, 51.50 4.60
Mesaba, bessemer, 51.50 4.60
Mesaba, non-bessemer, 51.50 4.45
High phosphorus, 51.50 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, \$30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

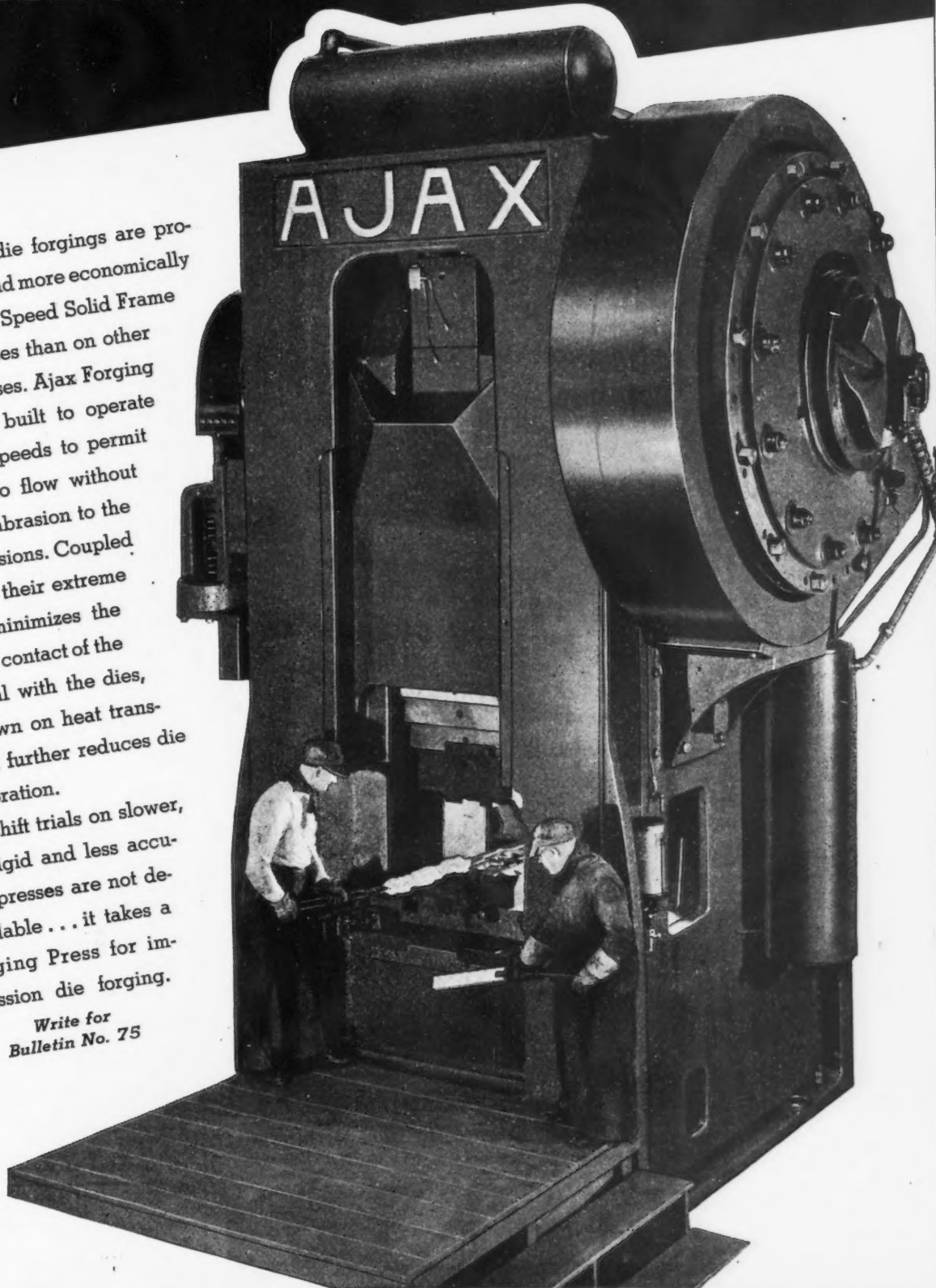
Base price per short ton
Effective CaF₂ Content:
70% or more \$83.00
65% but less than 70% 32.00
60% but less than 65% 31.00
Less than 60% 30.90

Buy a Forging Press for IMPRESSION DIE FORGING

IMPRESSION die forgings are produced faster and more economically on Ajax High Speed Solid Frame Forging Presses than on other types of presses. Ajax Forging Presses are built to operate at correct speeds to permit hot metal to flow without excessive abrasion to the die impressions. Coupled with this, their extreme rigidity minimizes the period of contact of the hot metal with the dies, cuts down on heat transfer and further reduces die deterioration.

Makeshift trials on slower, less rigid and less accurate presses are not dependable... it takes a Forging Press for impression die forging.

Write for
Bulletin No. 75



AJAX

MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND 17, OHIO

621 MARQUETTE BUILDING • CHICAGO 3, ILLINOIS

**ROSS
FOR THE
BIG JOBS**



LIFT THAT LOAD AS A UNIT . . AT LESS COST!

Consider your own handling problems. Are your heavy or bulky materials being lifted, loaded, tiered or unloaded by hand—piece by piece? . . . or perhaps by methods limited to certain fixed positions? If so, here is an opportunity to make a drastic reduction in overhead expense. With Ross Heavy Duty Lift-Trucks, materials are handled in unit-loads at costs which defy comparison. Several sizes and capacities to choose from. Write today for Bulletin 1-25.

ROSS . . for the Big Jobs

The ROSS CARRIER COMPANY, Benton Harbor, Michigan
Branches: Seattle - San Francisco - Vancouver, B.C. - New York City - Hoboken, N.J. - Portland



PRICES

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... \$31.00
Exceptions: Phoenix Iron Co. may charge \$38.75; Kaiser Co., \$43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., \$34.25; Pgh. Steel Co., \$33.10.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown..... \$36.00
Exceptions: Phoenix Iron Co. may charge \$43.00; Empire Sheet & Tinplate Co., \$39.25, f.o.b. Mansfield, Ohio; West Coast producers, \$48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., \$38.10.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh..... \$45.00
Exceptions: C/L delivered Detroit add \$2.00; delivered East Michigan add \$3.00. Connors Steel Co. may charge \$45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.00 higher; delivered E. Michigan, \$3 higher; f.o.b. Duluth, billets only, \$2.00 higher; billets f.o.b. Pacific ports are \$12 higher. Provo, \$11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

Per Gross Ton
Rerolling..... \$34.00
Forging quality..... 40.00
For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton..... \$54.00
Price delivered Detroit \$2.00 higher; East Michigan, \$3.00 higher.

Shell Steel

Per Gross Ton
3 in. to 12 in..... \$52.00
12 in. to 18 in..... 54.00
18 in. and over..... 56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are \$2.00 higher; East Michigan, \$3 higher.
Price Exception: Follansbee Steel Corp. permitted to sell at \$13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of \$52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.
Per Gross Ton
Open hearth or bessemer..... \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.
Per Lb.
Grooved, universal and sheared .. 1.90c.

Wire Rods

(No. 5 to 9/32 in.)
Per Lb.
Pittsburgh, Chicago, Cleveland ... 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.50c.
Galveston 2.25c.
9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

Base per lb.
High speed 67c.
Straight molybdenum 54c.
Tungsten-molybdenum 57 1/2c.
High-carbon-chromium 43c.
Oil hardening 24c.
Special carbon 22c.
Extra carbon 18c.
Regular carbon 14c.
Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.



UMBRELLA MAKER
... TO THE U. S. N.



Umbrellas are not always for weather protection. To the Navy the "umbrella" is the protecting layer of five-inch anti-aircraft gun fire during enemy attacks, an "umbrella" that keeps heavy bombers high and ineffective.

Bases, carriages and slides for these remarkably accurate Navy guns, welded and machined at Danly, are mounted on Navy ships throughout the world . . . important proof of the value of precision welded steel fabrication.

DANLY MACHINE SPECIALTIES, INC.

2100 SO. 52nd AVE.



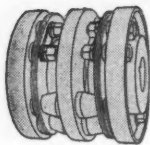
CHICAGO 50, ILLINOIS

DANLYWELD

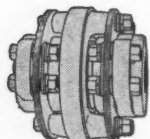
Danly Die Sets • Die Makers' Supplies • Welded Steel Fabrication

THOMAS

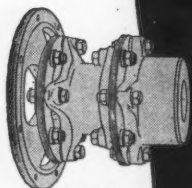
Flexible COUPLINGS FOR any SPEED OR SERVICE



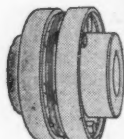
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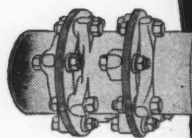
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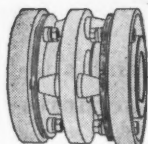
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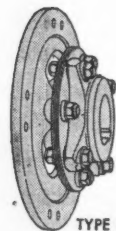
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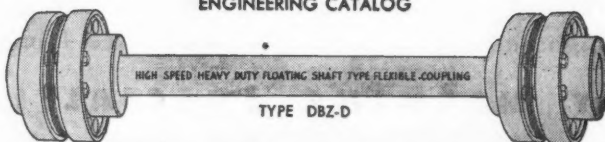
TYPE AM



TYPE MT



TYPE SS



TYPE DBZ-D

THE THOMAS PRINCIPLE ELIMINATES CHAINS,
SPUR GEARS and other VIBRATING MAKESHIFTS

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Eliminate
BACKLASH, FRICTION,
WEAR AND CROSS-PULL
.....the 4 destructive evils found in
all other types and makes of couplings.

NO BACKLASH
NO WEAR
NO LUBRICATION
NO THRUST
FREE END FLOAT

These are the five essential features of
Thomas Flexible Couplings that insure
a permanent care-free installation.

WRITE FOR COMPLETE
ENGINEERING CATALOG

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District
and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)
Base Price—\$200.00 per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

½ in.	24	3½
¾ in.	30	10
1 and 1½ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ in. and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as Above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe
jobbers are granted a discount of 5%. On
less-than-carload shipments prices are
determined by adding 25 and 30% and
the carload freight rate to the base card.
F.o.b. Gary prices are two points lower
discount or \$4 a ton higher than Pitts-
burgh or Lorain on lap weld and one
point lower discount, or \$2 a ton higher
on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago....	\$54.80
6-in. and larger, del'd New York....	52.20
6 in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle. 71.20	
Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle. De- livered prices do not reflect new 3 per cent tax on freight rates.	

BOILER TUBES

Seamless Steel and Lap Weld Commercial
Boiler Tubes and Locomotive Tubes.
Minimum Wall. Net base prices per 100
ft. f.o.b. Pittsburgh, in carload lots.

	Seamless	Lap Weld
	Cold	Hot
	Drawn	Rolled
2 in. o.d. 12 B.W.G. 15.03	13.04	12.38
2½ in. o.d. 12 B.W.G. 20.21	17.54	16.53
3 in. o.d. 12 B.W.G. 22.48	19.50	18.35
3½ in. o.d. 11 B.W.G. 23.37	24.62	23.15
4 in. o.d. 10 B.W.G. 35.20	30.54	28.66
(Extras for less carload quantities)		
40,000 lb. or ft. and over	Base	
30,000 lb. or ft. to 39,999 lb. or ft. 5%		
20,000 lb. or ft. to 29,999 lb. or ft. 10%		
10,000 lb. or ft. to 19,999 lb. or ft. 20%		
5,000 lb. or ft. to 9,999 lb. or ft. 30%		
2,000 lb. or ft. to 4,999 lb. or ft. 45%		
Under 2,000 lb. or ft.	65%	

PRICES

WIRE PRODUCTS

the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

Basing Pacific
Points Coast
Named Points†
Base per Keg

Standard wire nails....	\$2.80	\$3.30
Galvanized wire nails....	2.80	3.30
Wire nails, carloads....	3.85	.....
Base per 100 lb.		
Galvanized fence wire....	\$3.05	\$3.55
Galvanized galv. fence wire	3.40	3.90
Base Column		
Galvanized wire fence*....	.67	.35
Wire posts, carloads....	.69	.86
Single loop bale ties....	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire..	.70	.....

*15% gage and heavier. **On 80-rod
bolts in carload quantities.
†Prices subject to switching or trans-
portation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots		
Per Cent Off List		
1/4 in. & smaller x 6 in. & shorter....	65 1/2	
1/2 in. & 3/4 in. x 6 in. & shorter....	63 1/2	
1/2 to 1 in. x 6 in. shorter....	61	
1/2 in. and larger, all lengths....	59	
1/2 in. diameters over 6 in. long....	59	
1/2 in. all sizes....	62	
1/2 in. low bolts....	65	

Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)		
1/4 in. and smaller....	62	
1/2 to 1 in. inclusive....	59	
1/2 to 1 1/2 in. inclusive....	57	
1/2 in. and larger....	56	
On above bolts and nuts, excepting		
low bolts, additional allowance of 10		
per cent for full container quantities.		
There is an additional 5 per cent allow-		
ance for carload shipments.		

Hexagon Nuts U.S.S. S.A.E.

Base discount less keg lots		
1/4 in. and smaller....	64	
1/2 in. and smaller....	62	
1/2 in. through 1 in....	60	
1/2 in. through 1 1/2 in....	59	
1/2 in. through 1 1/2 in....	57	58
1/2 in. and larger....	56	
In full keg lots, 10 per cent additional		
discount.		

Stove Bolts

Consumer		
Packages, nuts loose....	71 and 10	
In packages, with nuts attached....	71	
In bulk....	80	
On stove bolts freight allowed up to		
5c. per 100 lb. based on Cleveland, Chi-		
cago, New York on lots of 200 lb. or over.		

Large Rivets

(1/2 in. and larger)		
Base per 100 Lb.		
f.o.b. Pittsburgh, Cleveland, Chi-		
cago, Birmingham....	\$3.75	

Small Rivets

(7/16 in. and smaller)		
Per Cent Off List		
f.o.b. Pittsburgh, Cleveland, Chicago,		
Birmingham....	65 and 5	

Cap and Set Screws

Consumer		
Per Cent Off List		
Upset full fin. hexagon head cap		
screws, coarse or fine thread, up to		
and incl. 1 in. x 6 in....	64	
Upset set screws, cup and oval points	71	
Milled studs....	46	
Flat head cap screws, listed sizes....	36	
Fillister head cap, listed sizes....	51	
Freight allowed up to 65c. per 100 lb.		
based on Cleveland, Chicago or New York		
on lots of 200 lb. or over.		

ROOFING TERNE PLATE

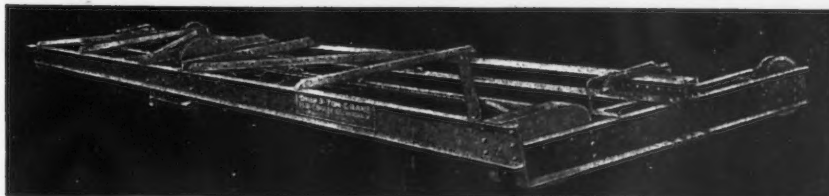
(f.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
3-lb. coating I.C....	\$6.00	\$12.00
12-lb. coating I.C....	7.00	14.00
20-lb. coating I.C....	7.50	15.00

CONCO

3-Motor Single Girder
CAB OR FLOOR
OPERATED

ELECTRIC CRANE ...



Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.

Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — \$139.50, 500 lb. — \$149.50, 1000 lb. — \$159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.



CONCO ENGINEERING WORKS

Div. of H. D. Conboy & Co. — 15 Grove St. — Mendota, IL.

Builders Of Conco Torpedo Electric Hoist

MACHINED BRONZE BEARINGS GRAPHITED AND OILLESS BRONZE BEARINGS BRONZE GEAR BLANKS MACHINED BRONZE PARTS

S & H Bronze Bearings are made of cast bronze, under the most modern conditions and of specifications to meet the most exacting requirements. We are manufacturers of plain bronze and graphited and oilless bronze bearings for all branches of the Government Services, as well as plain cylinder type, single and double flange, thrust washers, from 3/8" in diameter to 20" in diameter. We also manufacture special parts made of cast bronze. Our manufacturing methods and equipment enable us to meet the most exacting machining specifications.

If it's Bronze



We make it

INDUSTRIAL

BEARINGS

S. & H. Bearing and Manufacturing Co.

340-344 North Avenue, East

Cranford

New Jersey

PRICES

PIG IRON

All prices set in bold face type are maximums established by OPA as of February 14, 1945. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maximum. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Beeton	\$26.50	\$26.00	\$27.50	\$27.00	.....	.....
Brooklyn	26.50	26.00	27.00	27.00	.....	.....
Jersey City	27.53	27.03	28.53	28.03	.....	.....
Philadelphia	26.84	26.34	27.84	27.34	\$31.74	.....
Bethlehem	\$26.00	\$25.50	\$27.00	\$26.50	.....	.....
Everett, Mass.	26.00	25.50	27.00	26.50	.....	.....
Swedeland, Pa.	26.00	25.50	27.00	26.50	.....	.....
Steelton, Pa.	26.00	25.50	27.00	26.50	\$30.50	.....
Birdsboro, Pa.	26.00	25.50	27.00	26.50	30.50	.....
Sparrows Point, Md.	26.00	25.50	27.00	26.50	.....	.....
Erie, Pa.	25.00	24.50	26.00	25.50	.....	.....
Neville Island, Pa.	25.00	24.50	25.50	25.00	.....	.....
Sharpsville, Pa. (1)	25.00	24.50	25.50	25.00	.....	.....
Buffalo	25.00	24.00	26.00	25.50	30.50	.....
Cincinnati, Ohio	26.11	25.61	.....	26.11	.....	.....
Canton, Ohio	26.39	25.89	26.89	26.39	33.69	.....
Mansfield, Ohio	26.94	26.44	27.44	26.94	33.86	.....
St. Louis	25.50	25.50	.....	.....	.....	.....
Chicago	25.00	24.50	25.50	25.00	36.46	\$37.34
Granite City, Ill.	25.00	24.50	25.50	25.00	.....	.....
Cleveland	25.00	24.50	25.50	25.00	33.42	.....
Hamilton, Ohio	25.00	24.50	25.50	25.00	.....	.....
Toledo	25.00	24.50	25.50	25.00	33.42	.....
Youngstown	25.00	24.50	25.50	25.00	.....	.....
Detroit	25.00	24.50	25.50	25.00	.....	.....
Lake Superior, Ic.	.....	.....	.....	.....	34.00	.....
Lyles, Tenn., Ic. (2)	.....	.....	.....	.....	33.00	.....
St. Paul	27.63	27.13	28.10	27.63	40.80	.....
Duluth	25.50	25.00	26.00	25.50	.....	.....
Birmingham	21.38	20.00	26.00	.....	.....	.....
Los Angeles	27.95	.....	.....	.....	.....	.....
San Francisco	27.95	.....	.....	.....	.....	.....
Seattle	27.95	.....	.....	.....	.....	.....
Provo, Utah	23.00	22.50	.....	.....	.....	.....
Montreal	27.50	27.50	.....	28.00	.....	.....
Toronto	25.50	.....	.....	26.00	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace..... \$24.50

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry basic, bessemer and malleable.

(2) Price shown is for low-phosphorus iron; high phosphorus sells for \$38.50 a ton the furnace.

Basing point prices are subject to switching charges; Silicon differential (not to exceed 50c. a ton for each 0.1 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent). Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, \$2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and \$1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	.....	21 1/2 to 23 1/2
Copper, reduced, 150 and 200 mesh	.....	20 1/2 to 25 1/2
Iron, commercial, 100 and 200 mesh 96 + % Fe	.....	12 1/2 to 15 1/2
Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots	.....	40
Iron, hydrogen reduced, 300 mesh and finer, 98 1/2 + % Fe, drum lots	.....	63c
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c	
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	.....	42c
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	.....	90c
Aluminum, 100 and 200 mesh	.....	23 to 27c
Antimony, 100 mesh	.....	30.6c
Cadmium, 100 mesh	.....	1
Chromium, 150 mesh	.....	11.00
Lead, 100, 200 & 300 mesh	.....	11 1/2 to 12 1/2
Manganese, 150 mesh	.....	51c
Nickel, 150 mesh	.....	51 1/2
Solder powder, 100 mesh	8 1/2c plus metal	
Tin, 100 mesh	.....	58 1/2
Tungsten metal powder, 98-99%, any quantity, per lb.	.....	\$2.60
Molybdenum powder, 99%, in 300-lb. kegs, f.o.b. York, Pa., per lb.	.....	\$2.50
Under 100 lb.	.....	\$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	\$7.00
Foundry, beehive (f.o.b. oven)	.....
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	.....
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.83
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.35
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge \$7.75 per ton plus transportation charges.

**You Can Depend On
"HERCULES" (RED STRAND) WIRE ROPE
For Low Operating Cost**

Round Strand
Flattened Strand
Standard & Preformed

WHY not let "HERCULES" (Red-Strand) Wire Rope help you meet present day production requirements and still maintain a reasonable margin of profit? You will quickly discover that "HERCULES" is a dependable ally—not only in today's fight against increasing operating costs—but also in your endeavor to speed up production.

Made Only By **A. LESCHEN & SONS ROPE CO.** Established 1857
5909 Kennerly Avenue, St. Louis 12, Mo.
New York • Chicago • Denver • San Francisco • Seattle • Portland

PRICES

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis.....	\$66.55
First quality, Pa., Md., Ky., Mo., Ill.	52.35
First quality, New Jersey.....	57.70
Sec. quality, Pa., Md., Ky., Mo., Ill.	47.95
Sec. quality, New Jersey.....	52.55
No. 1 Ohio.....	44.30
Ground fire clay, net ton.....	7.30

Silica Brick

Pennsylvania and Birmingham ..	\$52.85
Chicago District ..	60.65
Silica cement, net ton (Eastern)...	9.25

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt.,	
Plymouth Meeting, Chester	\$54.00

Magnesite Brick

Standard, Balt. and Chester	\$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester	
in sacks (carloads)	\$43.48
Domestic, f.o.b. Chewelah, Wash.	
(in bulk)	22.00

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb.,	
No. 1 O.H., gross ton	\$43.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points) Per Gross Ton	
Light rails (from billets)	\$43.00
Light rails (from rail steel)	39.00
Base per Lb.	
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plate, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to rail-	
roads	5.00c.
Track bolts, jobbers discount	63-5
Basing points, light rails, Pittsburgh,	
Chicago, Birmingham; cut spikes and tie	
plates—Pittsburgh, Chicago, Portsmouth,	
Ohio, Weirton, W. Va., St. Louis, Kansas	
City, Minnequa, Colo., Birmingham and	
Pacific Coast ports; tie plates alone—	
Steelton, Pa., Buffalo. Cut spikes alone—	
Youngstown, Lebanon, Pa., Richmond,	
Oregon and Washington ports, add 25c.	

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	33.50c.	31.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.
F.o.b. Granite City, add 10c. per 100	
lb. on field grade to and including	
dynamo. Pacific ports add 75c. per 100	
lb. on all grades.	



THE use of worm gear speed reduction in Reading Electric Hoists allows you to fit the hoist to your plant layout subject to local conditions of clearance, space available, etc. These hoists are composed of four interchangeable units—suspension unit, hoisting unit, motor unit and control unit. Under this Reading Unit

Construction Plan, 144 different combinations of these units are available to give you special equipment at the low cost of standard parts.

Other advantages of this worm gear construction are: quiet operation, compact size, and low cost of maintenance because of only three moving units in the hoisting mechanism.

It will pay you to investigate the money saving features of Reading Electric Hoists. For full technical information, write for Bulletin 1004.

READING CHAIN & BLOCK CORPORATION
2101 ADAMS ST., READING, PA.

CHAIN HOISTS • ELECTRIC HOISTS • OVERHEAD TRAVELING CRANES

READING HOISTS



HEAT-TREATED STEEL SHOT

We manufacture
shot and grit for
endurance

A shot or grit that will blast fast with a clean finish.

Heat-Treated Steel Shot and Heat-Treated Steel Grit

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

The unprecedented demand for our—

**HARRISON
ABRASIVE
CORPORATION**
Manchester, New Hampshire

HEAT-TREATED STEEL GRIT



Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.
 Carload lots (bulk)\$135.00
 Carload lots (packed) 141.00
 Less ton lots (packed) 148.50
 \$1.70 for each 1% above 82% Mn; penalty, \$1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.
 96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.
 Carload, bulk 36c.
 L.c.l. lots 38c.
 95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.
 Carload, bulk 34c.
 L.c.l. lots 35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.
 16-19% Mn 19-21% Mn
 3% max. Si 3% max. Si
 Carloads \$35.00 \$36.00
 Less ton 47.50 48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
60% Si ...	6.65c.	7.10c.	7.25c.
75% Si ...	8.05c.	8.20c.	8.75c.
80-90% Si ...	8.90c.	9.05c.	9.55c.
90-95% Si ...	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.
Silvery Iron
 (C/L, Per Gross Ton, base 6.00 to 6.50 \$t)
 F.o.b. Jackson, Ohio\$30.50
 Buffalo 31.75
 For each additional 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add \$1 a ton for 0.75% phosphorus or over.

Bessemer Ferrosilicon

Prices are \$1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk.	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	6.05c.	6.70c.	6.90c.
2000 lb. to carload	6.05c.	6.70c.	6.90c.
Under 2000 lb.	6.90c.	6.90c.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.	6.30c.	6.55c.
2000 lb. to carload	6.30c.	6.55c.	6.55c.
Less ton lots	6.55c.	6.55c.	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)
 OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .35c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr	13.00c.	13.40c.	14.00c.
4-10% Cr	13.00c.	13.40c.	14.00c.
62-66% Cr	13.50c.	13.90c.	14.50c.
5-7% C	13.50c.	13.90c.	14.50c.

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads	Ton Bulk	Less Ton
0.10% max. C, 1 or 2% max. Si	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	6.05c.	6.30c.	6.50c.
Carload, bulk	6.05c.	6.30c.	6.60c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots	6.80c.	7.80c.	8.80c.

Calcium-Manganese-Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
16-20% Ca, 14-18% Mn, 53-59% Si.	15.00c.	16.00c.	18.05c.
Add 0.25c. for spot sales.	16.50c.	17.35c.	19.10c.
Less ton lots	17.00c.	17.85c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	\$1.80	\$2.30	\$5.00
Less ton lots	2.30	2.80	5.75

Chromium-Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot 45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	\$1.20	\$1.2075	\$1.229
Less ton lots	1.30	1.3075	1.329

Manganese-Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales. 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	\$1.89	\$1.903	\$1.935
Less ton lots	2.01	2.023	2.055

Nickel-Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern Zone	Central Zone	Western Zone
11,200 lb. or more	\$1.90	\$1.9125	\$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade, lump or 1/4X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., New York, Pa., per lb. contained tungsten, 10,000 lb. or more.... \$1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.

Open hearth	\$2.70
Crucible	\$2.80
Primos	\$2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal..... \$1.50

Vanadium pentoxide, 88%-92% V₂O₅ technical grade, contract basis, any quantity, per lb. contained V₂O₅. Spot sales add 5c. per lb. contained V₂O₅ \$1.10

Silicaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)

Carload lots	25c.
2000 lb. to carload	26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)

Carload lots	58c.
2000 lb. to carload	59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis

No. 1	87.5c.
No. 6	60c.
No. 79	45c.

Bortram, f.o.b. Niagara Falls

Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb. 2000 lb. lots \$2.25

Under 2000 lb. lots \$2.30

Ferrotitanium, 40%-45%, 0.10% C max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. \$1.23

Less ton lots \$1.25

Ferrotitanium, 20%-25%, 0.10% C max., ton lots, per lb. contained titanium \$1.35

Less ton lots \$1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload.... \$142.60

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with \$3 unitage freight equalled with Rockdale, Tenn., per gross ton \$58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage freight equalled with Nashville, per gross ton \$75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo. 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo. 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add 1/4c. for spot sales

Carload lots	14c.
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy	4.6c.

Carload, bulk 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk 5.75c.

Ton lots 7.35c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.

Car lots	8.00c.
Ton lots	8.75c.
Less ton lots	9.35c.